

A

**POPULAR ESSAY**

ON THE

**LAWS OF ACOUSTICS,**

AND ON THE

**ANATOMY AND PHYSIOLOGY OF THE EAR.**

FOLLOWED BY

**SEVENTYSEVEN CASES**

OF

**PERSONS CURED OF DEAFNESS,**

BEING

SIMPLE ABSTRACTS OF EACH INDIVIDUAL CASE.

—♦♦♦♦—

**BY JOSEPH TOGNO, M. D.**

MEMBER OF THE PHILADELPHIA MEDICAL SOCIETY, AND OF THE PHILADELPHIA  
COLLEGE OF PHYSICIANS.

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“LET THE DEAF HEAR.”

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PHILADELPHIA:

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1834.

THEATRUM MUSICO-MATHEMATICUM

BY J. S. BACH

WITH A HISTORY OF THE THEATRUM MUSICO-MATHEMATICUM

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## TO THE READER.

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THOSE persons who are afflicted in the least with deafness, or with any malady in their ears, and who are desirous of consulting Dr. Togno, will greatly facilitate the cure of their infirmity, by calling on him soon after they may perceive it.

Dr. Togno's Infirmary for the Cure of Deafness and the Deformities of the Body, No. 98 Locust street, above Ninth.—He may be consulted every morning, from 9 o'clock till 12 A. M.

*N. B.* Advice to the poor *gratis*.



## PREFACE.

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AWARE that the public generally have no knowledge that many who are deaf may be restored to their former hearing, by a scientific and appropriate treatment, we have been induced, for the benefit of this interesting and forlorn class of society, to publish seventyseven striking cases of persons generally known, which will carry conviction of this fact to their minds ; and because we conceive, also, as our celebrated Dr. Benjamin Rush used to say, "that whatever has a tendency to lessen the sum of human misery, ought to be published and placed within the reach of the distressed."

Who now can doubt, after the experience we have had, that a *complete cure* is possible in more than one half of the cases, skilfully treated after the present improved methods ? Who can now doubt that we have, in the course of two or three years, *restored* to society and usefulness, more than **NINETY** individuals ? Let those who yet may question the possibility of restoring the deaf to their hearing, read some of the following cases, especially those marked by a star, and then, should they be incredulous as to the efficacy of medical science, should there yet be a sceptic to convince, we will, for the present, only say, that we are now treating individuals, whose cases shall come before the public in such an authoritative shape as to anticipate and remove every objection, and enforce conviction on the most sceptical mind.

The number of the deaf who have consulted us during the space of two or three years, has amounted to more than **ONE HUNDRED AND THIRTY**, out of which number **NINETY-SEVEN** were treated—**SEVENTY-SEVEN** of whom were cured, and thirty greatly improved. Of those completely cured, there were many who were pronounced by eminent professional men as incurable, and had thus been consigned to *eternal deafness and silence*. Several would have been *idiotic* during the remainder of their lives, while now they are intelligent and useful members of society. We shall instance the cases of young Beauregard, Miss Camm, Miss E. Coyles, &c., all related in full in the following pages.

This happy result we obtained previously to our late visit to Europe (whither we went purely for information on this obscure subject) when we had had no other opportunity than our own observation to instruct us in the arduous task of curing the diseases of the organ of hearing.

Our late travels and residence in Europe, have been a great source of improvement, through the kindness of Dr. Deleau, of Paris, who afforded us many opportunities to become acquainted with his method of treatment, according to the infinite number of cases that his daily

practice brings within his observation. Dr. Deleau is the only medical man who has, of late, advanced, in Europe, this department of the healing art, and improved several processes of medicine, applicable to the cure of deafness. To him we are indebted for much information, and we are pleased and proud thus to acknowledge our gratitude, and testify to his superior talent as an aurist.

We have in our country celebrated *occultists*, *Accoucheurs*, and in our friend Dr. Samuel Jackson, a justly celebrated *Pulmonist*, who has treated with so much success the fatal diseases of the lungs; but still, we have as yet no *AURISTS* who have made the study of the diseases of the *EAR* their principal pursuit. Why should this neglect exist with respect to this most essential organ? Is the sense of hearing less important than the visual, in the relations of man to society, or with himself, in the benefits to be derived through the best method of improving the mind, namely, *oral instruction*?

The loss of sight has for its consequence that of perceiving distant objects and that of colours generally. The blind is nevertheless cheerful and happy in the society of his friends, and he can, in many instances, arrive at astonishing degrees of perfection of touch and delicacy or nicety of hearing, so as to discriminate the distance of bodies, and be able to avoid them as if they were visible to them; while he who is deaf is completely cut off from society, and only communicates, if he be an educated *deaf and dumb* person, with those who have learnt his symbolical language, who, by the by, are as rare as those who speak the latin language. But should he be deaf without even this means of communication, as is generally the case with those who have become so since their adolescence, then they want even this link of connection with society, and they become perfectly senseless statues. They are unhappy, and suspicious of every one about them; they look at every thing; watch every motion of the body, and movement of the lips, without understanding any thing, which only irritates them the more by leaving their curiosity ungratified, and by making them the more aware, at every moment, of their severed state, and of their forlorn condition, which tends to produce that habitual state of sad melancholy, and, in many, stupidity, so generally observable.

There is no case, as with the blind, in which their state is sweetened by society, or even by inanimate surrounding objects; for the loss of the sweet melody of friendly speech; of cheerful conversation; of the pleasurable sensations to be derived from the simple "concord of sweet sounds;" every one of which are far more calculated to produce expansive and joyful sensations, than the mere harmony of colours, and are far greater losses to the deaf than the blind. Look at the cheerfulness of the blind, and compare it with the sober, grave, uncommunicative demeanour of the deaf, and at once you will be able to appreciate the lesser loss of these organs in the former than in the latter.

Congenital malformation of the organs of hearing is not more frequent than that of the eye, or any other organ. It is a general, but erroneous and fatal mistake, to suppose that the contrary is the case, and that this state is irremediable. This conclusion has been adopted simply because this organ is farther removed from the everyday observation of the great mass of individuals—because the laws of the propagation of sounds, or the science of acoustics are not so well known as those of light, or the science of optics. The laws of the propagation of sound are rather obscure when inert matter is concerned; but when they are applied to animate beings, such as our organs of hearing (the

only part of our bodies that is sensible to the undulations of the ambient air, and can apprehend sounds) then the greatest confusion exists, and it requires a vast and comprehensive mind, constantly bent on these subjects, to seize the thread of this new labyrinth, to extricate oneself from this maze of difficulties. Then, when we review the immense number of causes calculated to affect this organ (which are not less than seventy, directly or indirectly) and that, too, so small a number of physicians have bestowed, on the diseases of the ear, any portion of their time, and that none, as yet, in this country, have consecrated to its study and advancement, the whole of their mental powers, it is not to be wondered at, that so few should ever have been cured, that the patients should have been discouraged, and that we should now have so great a proportion of deaf persons in our community.

Many are *supposed* entirely deaf who could, with a fit treatment, be more or less restored to their hearing. Dr. Itard,\* in a memoir to the Minister of the Interior, states, that absolute deafness is comparatively rare, and that not more than *onefifth* of the cases of *deafness and dumbness*, which have come before him, have presented a state of total deprivation of the sense of hearing. It is cruel and inhuman to condemn an individual to remain forever deaf and dumb, before some attempts at least be first made to cure, or at least to improve him. We *ought* not to deem a patient incurable, and subject him to all the consequences of such deadly decision, before being submitted to a rational mode of treatment. It is erroneous to suppose that every congenital deafness proceeds from malformation of the organ, or from a complete paralysis of the auditory nerves, and, in so doing, pronounce the deafness as incurable, and every attempt to restore it as fallacious and nugatory.

Many persons who should have had our experience in the treatment of the diseases which produce deafness, would think themselves authorised to speak dogmatically and with prolixity on their *superior* treatment of these affections; but desiring to be sure of what we might assert rather than to be considered the *first* who did assert it, we wish, before publishing any one treatment for any given disease, to have all the physical and moral certitude that such cases may be capable of, so as not to have to *unsay hereafter* (as many are obliged to do) what we may have asserted at present. We, therefore, abstain from drawing any positive conclusion as yet, or *hasty* general principles from what we consider to be yet too small a number of facts for generalization. However, we give the facts themselves, and they, after all, are the most important part. The object of the science of medicine is to cure human infirmities; if we have attained this end, the cases here recorded will, we hope, testify to the truth of our assertion.

\* DR. ITARD is the medical gentleman who has the superintendence of the Deaf and Dumb Institution of Paris, and who has written the best classical medical book on the diseases of the organ of hearing.



## INTRODUCTION.

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EVERY reflective mind must have remarked the wonderful fitness existing between physical agents and the organs of animals, or that of their construction with *reference* to these agents.

This general fitness, or corresponding coincidence of one thing with respect to another, produces that beautiful and general harmony which we so much admire, and which pervades the universe.

The question, next, naturally arises in our minds, are things the result of the laws which govern the *universe*—animate or inanimate—or are the bodies constituting it the cause of these laws?

This is a most subtle and moot point, which shall not detain *us* a moment, but which *future* philosophers may, perhaps, settle.

But the thing to which we wish to draw the attention of our readers, is, that, from the double formation of our organs of sense, there results another beautiful law, constituting one of the many blessings we enjoy, the simple result of the senses with which our benevolent Creator has endowed us. We mean the highly gratifying pleasure we experience from *symmetry*, be it of *form, colours, size, distances, or regular succession of sounds*.

From this law, we conceive, arises the *beau ideal* of nature's works and man's productions in the fine arts, which are always mere copies or types of things derived from this inexhaustible mother of beauty.

These are *general laws*, and, to a certain extent, exist all over our globe, but under an infinite variety of modifications of forms, in consequence of the infinite variety of climates inhabited by man.

From this circumstance another law follows, that not two districts of this vast globe, nourish men, animals, or plants, which, in any respect, may be said to be perfectly alike.

What a vast difference exists between men living even under the same latitude! Consider, for instance, the proverbial stupidity and idiotism of the inhabitants of the Valais, in Switzerland, and the spiritual gayety of the Provinçals? Contrast, also, the thievish Bedouin Arab, dried up by his arid deserts of sand, not very unlike the thorny and salt plants of the same clime, with the generous, sumptuous, and stately Mameluke, or the Mussulman of Cairo, not very unlike the luxuriant growth of the plants which vegetate on the rich banks of the Nile.

Then, not only every country has a peculiar influence on the temperament, character, and physical, as well as moral constitution of its inhabitants, but this influence is felt even in the smallest districts. Such, however, is the physical constitution of man, that he gradually changes his habits whenever he emigrates to another country.

Light, and heat which generally accompanies it, is one of the most indispensably necessary elements to the existence of man ; and this materially helps to produce those physical and moral differences. But the one which is the subject of our present investigation is *sound*.

It gives rise to the sensation of hearing, without which the ear would be useless. This latter agent, unlike the former, is not indispensably necessary to our growth, health, and, indeed, existence, but is merely the means of procuring us some of the most lively, pleasing, and delightful sensations—that of furnishing us with the quickest means of intercourse with our fellow beings, and, perhaps, that which assists us most in enlarging and expanding our intelligence, by the use of oral and written languages.

This organ—the ear—is first observed in the animal series to become gradually simpler and simpler in its structure : and it ultimately disappears before any other organ of sense, as we descend the scale of beings, from man to the lower animals : therefore it presents itself in a nobler point of view.

The reason why this occurs may be easily elucidated. It is because these animals were not intended, by their structure, to live in society ; consequently, this sense would have been supernumerary and useless; for hearing is the most sociable of the senses.

The nervous system is entrusted with the power of regulating and supporting the vital energies—indeed, we may say, it is life itself—for, without it, life no longer exists, as we see it exemplified in the vegetable kingdom, which is *organized*, but, to speak with propriety, has no life. In fact, this system is the *mystery* of our being or organization—so that *life* may be, indeed, called a *mystery* ; for he is in error, who considers *life* to consist of the dull commonplace deeds that engross every moment of the horde of mankind : that is not life. *Life*, to them, consists in having a pretty domicile, extensive pleasure grounds, and in the intoxicating infatuation of accumulating and hoarding metals of the greatest *specific gravity*,

“ So much trash as may be grasped thus ! ”—SHAKSPEARE.

But life—intellectual life—the life of the man who *looks* not on these fleeting dreams of happiness with eager eye—that life which struggles with the little shell of clay that incases it—*coming*, it knows not whence, *going*, it knows not where ; forming the mystery of the past, and that of the future encircled with eternity and boundless space ; this life is full of mystery, and joy, and celestial glory, that the abject creatures of the dust can never know.

Not only is the exercise of the mind in the production of thought wonderful, but the simple act of walking, the result of volition caused by the nervous system, is an object of astonishment.

Suppose we were brought into existence in the full maturity of all our faculties ; if time had not rendered our sensations obtuse, so as to perform many functions, with scarcely any consciousness of the action, we should feel the same strange and thrilling doubt, as does the untaught infant, when we made a step, for the first time, whether another would follow. We would pause with awe at every step, and wonder at what now is a familiar action, performed with careless confidence of its happy result. For who can acquire any knowledge of the mysterious connection between *mind* and *body*, or between the *invisible* and *tangible frame* ?

Hence, we have authors who write and talk *largely* and *unintelli-*

gibly of the intellectual faculties, without being acquainted with their real organs. But we also have those, however few they be, who modestly treat of them, possessing that indispensable knowledge—that of the organs—which enables them to speak of both in a *becoming manner*.

Thus this mysterious link unites, in an equally mysterious manner, mind with matter. This *link* connects the *extremes* of creation, and thus, not only its most opposite and incongruous elements are blended together, but are so blended in perfect harmony, and in the most intimate sympathy. This mingles celestial life and light with dark and senseless matter; in a word, the boundless thought hath bodily organs. Here, that, which in a moment glances through the immeasurable space, has its abode within the narrow bounds of nerves, senses, and brain. The humble clay is majestically built up into the dome of thought, the “palace of the soul.” The dust we tread upon, forms, in the mysterious frame of our humanity, the dwellingplace of high reasoning thoughts, and moulds the heart that responds to every generous emotion or lofty affection of the mind.

Who can explain this mysterious union—inform us *where* sensation ends, and thought blooms forth, and, like a promethean fire, illuminates the universe, or *where* organization passes into *life*?

Materialist and immaterialist philosophers in all ages, have contended for the ascendancy of their favourite doctrines, and thus the power of *matter* and *spirit*, has been marshalled in the contest, and guided by the human microscope—the mind. But the war has been nearly fruitless, the arguments often futile, and seldom useful. Philosophers have settled one point only, namely, our infinite ignorance.

In every department of study we, sooner or later, reach an unknown region, into which we cannot penetrate. Every way around us, whatever be the course we pursue, our thoughts terminate in the unknown, the indefinite, the vast, the incomprehensible, the darkness invisible. *Time* stretches its lengthening course to *eternity*; *place* expands to boundless immensity; *number* accumulates to numbers without numbers; *being* passes from the mite to infinite purity and greatness.—In a word, every path of our reflections bring us, at length, to the impenetrable *veil of the unknown* and the *unfathomable*.

Notwithstanding the apparent or real inferiority, and all the disadvantages under which man seems to labour, when compared with *other animals*, with respect to physical power, natural provisions for his comfort and individual existence, yet he is indisputably the *Lord of Creation*.

This high rank or station is granted to him, not by his mere physical force, but derived from a more elevated source, as far above physical power as divine power is above our intellectual faculties. For, if mere physical power formed his characteristic attribute, how could he cope with the lion, the tiger, the whale, the elephant, the horse, or the ox? Still, these are slaughtered by him to supply his wants; domesticated to do him service; or imprisoned and tamed to make him *sport*. Nature is in daily requisition to supply all his wants, and the forest, the ocean, the bowels of the earth, or the air which encircles his proud head, equally yield, reluctantly or with readiness, all their treasures to satisfy these wants.

These are some of the benefits resulting, not from mere physical power, but from our reasoning faculties.

Were this superior and continually increasing amount of external

comforts, and our means of preservation and sensual enjoyment, the only privileges we possessed over the *other* animals, conferred on us by these faculties, we should, after all, have not much to boast of. But, on the contrary, we *know*, and we are *conscious* of *wants* and *cravings*, in which the senses have very little part; of a series of pains and pleasures totally distinct in kind from any which the infliction of corporeal sufferings, or of ungratified bodily appetites have afforded us. These hold a much higher rank, and are more deserving our attention.

We remember Napoleon's reflection on Sir Hudson Lowe. "This man believes me a horse, which, when well fed, has *all* his wants satisfied; this man has no idea of *moral* wants." These reflections were made when the bust of his son, sent to him by an Italian artist, was, by the order of that infamous and barbarous governor, thrown into the ocean.

Besides the pleasures of imagination and social converse, we are speculative beings. We do not solely contemplate this harmonious universe so far as it is subservient to our comforts, but for the higher order of gratification resulting from its contemplation; because it is a most beautifully disposed system, *ruled* by *order*, and planned by foresight and wisdom.

Some of the wonders of the creation we are able rudely to imitate, when we understand them; others, although not beyond our comprehension as to the nature of the contrivance, are still beyond our power of imitation.

The farther we inquire, and the wider we extend our sphere of observation, the greater is the number of new objects for our consideration, which increase, abound, and thicken around us; and as the study of one object the better prepares us to understand and appreciate others; so improvement follows on improvement, wonder on wonder, till our faculties become bewildered in admiration, and our intellect despairs of ever arriving at the end.

"When, from external objects, man turns his view upon himself—on his own vital and intellectual faculties—he finds that he possesses a power of examining and analyzing his own nature to a certain *extent*, but no farther."

In his corporeal frame he is sensible of a power to communicate a certain moderate amount of motion to himself and other objects; that this power depends on his *will*, and that its exertion can be suspended or increased at pleasure within certain limits; but how his will acts on his limbs, he has no consciousness; and whence he derives the power he thus exercises, there is nothing to assure him, however he may desire to know.

His senses, too, inform him of a multitude of particulars respecting the external world, and he perceives an apparatus, by which impressions from *without* may be transmitted, as a sort of signal, to the *interior* of his person, and alternately to his *brain*, wherein he is obscurely sensible that the *thinking, feeling, reasoning being*, he calls *himself*, more especially resides.

When he contemplates, still more attentively, the thoughts, acts, and passions of this, his *sentient*, intelligent self, he finds, indeed, that he can remember, and by the aid of memory, can compare and discriminate, can judge and resolve, and, above all, that he is irresistibly impelled, from a perception of any phenomenon *without* or *within* him, to infer the existence of something prior, which stands to it in the re-

lation of a *cause*, without which it would not be : and that this knowledge of causes and their consequences is what, in almost every instance, determines his *choice* and *will*, in cases where he is conscious of perfect freedom to *act* or *not to act*.

He finds, also, that it is in his power to acquire more or less knowledge of causes and effects, according to the *degree of attention* he bestows upon them, which attention is again, in a great measure, a voluntary act of the senses, united to the mind as auxiliaries.

A world *within him* is thus opened to his intellectual view, abounding with phenomena and relations, and of the highest immediate interest. But while he cannot help *perceiving* that the *insight* he is enabled to obtain into this *internal sphere* of *thought* and *feeling* is, in reality, the source of all his power, the very *fountain* of his *predominance* over external nature, he yet *feels* himself capable of entering only *very imperfectly* into these recesses of his own bosom, and analyzing the power of his mind.

However, this should not deter us from the ardent pursuit of our enquiries after physical or mental truths ; on the contrary, we must cherish as a vital principle, an unbounded spirit of enquiry and research, and even foster and encourage an ardour of expectation beyond what *now*, for us, seems feasible. By so doing, we unfetter the mind from prejudices of every kind, and leave it open and free to every impression of a higher nature which it is susceptible of receiving. It is necessary, however, to guard against *enthusiasm* and *self-deception*, which may be easily prevented by a strict habit of continual and minute investigation.

The true character of a philosopher is to hope *all* things not impossible, and to believe *all* things, however extravagant they may at first appear, not unreasonable. He must go even as far as Locke, and doubt if *matter* may not have the faculty of *thinking*.

This cautious mode of proceeding will always be dictated to all observers, and especially to those who have studied the history of the progress of *arts* and *sciences*. The observer who has encountered obscurities, which appeared at first impenetrable, suddenly dispelled and rendered perfectly tangible ; or the most barren and unprofitable subjects, converted, as if by inspiration, into rich and inexhaustible springs of knowledge and power ; or a simple change in the application of a principle untried before ; or the discovery of a fact, at first, called idle and useless. Surely, such an observer will be very cautious to acquiesce in any discouraging prospects of the present, or of the future improvements of our species, and especially of a science based on correct observation, like that of medicine.



THE ORGANS  
OF THE  
SENSES IN GENERAL.

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He who hopes to become eminent in any branch of human knowledge, should first examine and understand what has been done by his predecessors in the same career ; then, to cast his eyes around upon the world, and consider the objects themselves—that is, his first task is to search books, and acquire all the intellectual treasures and lore which the diligence of former ages has accumulated ; and his next, by the contemplation of nature, to increase them by his own exertion, and by patient and laborious observation.

If genius can become gigantic by its own individual efforts, by the observation of nature alone, how much more boldly would it soar, when strengthened by study, and supported by the example of the talented individuals who have graced former ages, and who have become the true benefactors of mankind ?

Moreover, the rays, radiated or reflected from genius, warm, exalt, and enlighten a kindred spirit, while contemplating it, and they mutually animate each other by their scintillations.

Science alone, it is true, does not constitute genius, but it fecundates and causes it to flourish and fructify.

The sciences are sisters ; and they extend to each other their invaluable aid. While a student is uselessly wasting half of his life in researches to discover a fact already acquired and recorded by others, to obtain the knowledge of which, a few hours of study only would have been sufficient to make him possessor ; and by doing which he would be left, ever after, at liberty to employ his full power to enlarge, in his turn, the boundaries of science. This is our conviction on the subject.

For, what would avail the accumulated lore of past ages, were it lost to us ; and if we were, every one, individually, obliged to start from the same point, and run the same short intellectual race ? We should then be, *indeed*, like the mere brute of the field.

No ! ignorance of what our forefathers have done, tends no more to cure us of too implicit a confidence in their labours, or to shield us from former prevailing errors, than blindness is designed to teach us how to avoid precipices.

Science is the touchstone of all facts which are received as such, and scepticism closely follows it—it being indispensably necessary, that assertions and absurd hypotheses may not usurp the place of facts, and be introduced in the sacred domain of science.

This spirit of scepticism permits no new untried discoveries or facts to be admitted before they have undergone the severe ordeal of criticism

and scrutiny. So much the better! They require to be combatted to give to them more positive proofs, and place them on a firmer foundation. For, it is from the shock of minds, as from the attrition of pebbles, that light issues.

From such a contention, ultimately, *truth* and *genius*, in spite of opposition and envy, will always arise, and ride triumphant. So that now science is not a chaos of uncertainties, obscurities, and vanities.

Truth remains unchanged, is verified every day, and is *immortal*, like its supreme author. If the explanations of vain man perish with his mortal frame, they are like the autumnal falling foliage, but loaded with the sweetest fruit. As witty La Fontaine says:—

“ *Laissez dire les sots, le Savoir a son prix.*”

But to return from this digression.

By the organs of the senses, we mean the particular organs with which nature has endowed us, for the purpose of communicating impressions, and producing sensations, by the help of which the mind acquires the knowledge of bodies, and of their properties.

These sensations are either produced by the objects which surround us, or by a part of our body itself.

The organs of sense vary as to number and in point of delicacy, correctness, or aptness in different animals; and their united power fixes alone the amount of that knowledge of the universe which we can acquire. The number, development, and perfection of these instruments, are, in the animal series, the measure, to a certain extent, of the faculties of animals; and it is by their particular modifications, in different animals, that many of the various characteristics and degrees of educability are produced; and that their habits, so different in the animal creation, are attributive.

In man, these senses are feeling, or touch, taste, smell, sight, and hearing.

Before entering on the explanation of the organs of hearing, we shall first preface it by some general remarks applicable to all the senses.

*First*, These organs are all placed at the periphery, or near the external surface of the body, and have here their entrance. By this arrangement they are best situated to receive their peculiar stimulus or element, necessary to free and healthy exercise of their function, in a mediate contact with them, as light with the eye, and sound with the ear.

*Secondly*, The organs of sense are either symmetrical, that is, formed of two similar halves, or double. The skin, the tongue, and nose, are of the first kind; the ear and eye, of the second. Thus the whole body being considered as the organ of feeling, may be divided into two symmetrical halves; the two hands, the active organs of this sense, being the periphery of the organ.

The tongue, although a whole, is composed of two fleshy masses, and is, as in the case of the nose, divided by a middle partition, forming two symmetrical organs united in one.

It is a law of the formation of animals, that the nearer the organs are to the medial line, the more they have a tendency to run into each other, and to form one single organ.

Even the single organs of nutrition and secretion do not depart from this rule. The larynx and tracheæ; the œsophagus; the stomach and bowels; the pancreas; the bladder, &c, are of this number.

There seems, however, to exist an exception to this rule, and this is,

with respect to the liver and spleen, which, although apparently single and distinct, are not placed on the medial line. They appear so in the adult, but in the foetus and child, they are nearly in the medial line, and follow the rule of single organs.

The other organs of sense—the eyes and ears—are symmetrical and double, and somewhat removed from the medial line.

Both the symmetrical and double organs receive a symmetrical pair of nerves, one being distributed to the left half of the organ, and the other diffused over the right part of the same organ; in this manner each half receives from its side a distinct nerve for its special sensation.

From this anatomical structure, it follows that one side or half of these double organs may be partially or entirely lost without the other suffering in the least in its functions. So that one half of the body may lose its power of receiving impressions and conveying sensations, while the other retains it, even to an exquisite nicety; one half of the tongue may lose the power of tasting or of motion, and one nostril, that of discriminating odours, without the fellow-half of the same organ being in the least impaired from this circumstance.

From the same law of formation, another rule may be derived, namely, that those organs of sense, which are almost one and the same organ—as the tongue—are not only nearest to the medial line, but are those organs of sense more particularly destined for, and subservient to, the single organs of nutrition. Thus, of the five organs of sense, those of taste and smell, which are on this medial line, are the doorkeepers of nutrition; while those of sight, hearing, and touch, which are most removed from this medial line, are intended, more particularly, for the purpose of keeping us in constant relation with external bodies.

These latter organs seem to be more intimately connected with our intellectual faculties, although we confess that all contribute to the complete and perfect instruction and discipline of our mind.

*Thirdly*, However complicated or simple the organs of sense may appear, they may be divided into two principal parts: First, one nervous, which is the most deeply seated, and which, by the contact of the external agent or body, develops the impression whence results the sensation. This is the most important part; for the other may be partially injured, and still the organ perform its functions to a certain extent, while, if the nerve be affected, there is an end to the sensation.

The nerves, supplying the organs of sense, proceed from the *brain* and *medulla oblongata*, and are distributed so as to impart to them their peculiar fitness to receive and convey impressions; namely, the optic nerve, or the nerve of vision, is diffused over the internal part of the eye, for the purpose of receiving the rays of light and transmitting the impressions which they produce to the brain. The olfactory nerve is diffused over the membrane of the nose, to receive the impressions of odours, and produce smell; the nerves of hearing, or auditory nerves, are spread into the interior parts of the ear; those of taste, over the tongue; and the whole surface of the body has a delicate and extensive diffusion of nerves which impart sensibility.

*Second*, The other part is placed in advance of the nerve. It is destined to receive first the external body, and for this reason, it is generally constructed according to the physical laws which govern the body thus to be introduced. Thus, it is evident, that the apparatus in advance of the optic and auditory nerves, is, in the one, a true optical instrument, in the other, an acoustic apparatus, entirely constructed according to the physical laws of the propagation of light and sound.

We shall see that the perfection or extent of power of any one sense is always in proportion to the structure and more or less perfect combination of these two parts, that is, the proper nerve of the organ, and the apparatus in advance.

*Fourthly,* The organs of sense, being the instruments that the mind uses for acquiring a knowledge of things, their organs are subordinate to that of mind, and are therefore under the control of volition. We find, moreover, that they are furnished with an apparatus of voluntary muscles, which, at pleasure, expose or approach, and conceal or withdraw them from the contact or influence of external agents.

Volition, also, seems to exert, erect, or force, the nervous part of the organ to an active exercise, which augments its perception and action. This is proved by the greater degree of intensity we experience in a sensation, whenever that sensation is perceived with volition and attention. A person hard of hearing may hear more distinctly if we can fix his attention upon what is to be communicated. This class of persons particularly illustrate our idea, and, in the course of time, become so careless about the sounds which strike their auditory nerves, that their hearing is almost always passive: seldom being able to rouse and force it to become active, in consequence of the despondency of the mind, which affects the person thus situated, unwilling even to move, think, or will, their organs to hear.

*Fifthly,* The exercise of these organs may be, as we have already remarked, either passive or active, and in the latter case the organ is compelled by volition to meet, as it were, the impression, and everything in the organ is put in readiness to welcome it.

We may, therefore, justly conclude, that these organs, dependent on volition, are susceptible of being improved by education.

The education of these organs is confined to the measure of time and mode in which we employ them. The just proportion of the exercise of an organ has the tendency to augment its nutrition and development, and therefore acquire more volume and precision. It also facilitates and renders more sure and prompt the movements by which the organ fulfils its functions. If exercised too much, it is exhausted and impaired in a very short time; if, on the contrary, not sufficiently used, it becomes imperfect, not exact in the communication of its impressions, and dull;—and this deficiency gives to the individual all those characteristics which belong, more or less, to idiots. Indeed, to this is almost confined all the secret of educating our senses, and, of course, the improvement of man.

We believe that the education of these senses, and their degree of minute and correct observation may be brought to that state of perfection, which will enable them to appreciate the infinite divisibility of matter. In a word, we believe their perfectibility to be as infinite as the divisibility of matter is great, or the combinations of impressions and volition are endless.

We must carefully discriminate, however, with reference to their services, what belongs to the *organs alone*, from what belongs to, and demands besides, the intervention of *the mind*. Metaphysicians have generally neglected this latter intervention, and therefore have ascribed all to the senses, and thus have exaggerated their true value.

In every organ of sense we must distinguish two kinds of functions. The one is *immediate*, which consists in the simple sensation it conveys, it being *one* and the same for each sense; the others *mediate* or

auxiliary, that consist in the help they furnish to the mind, and by which the latter acquires the knowledge of things and of their properties. The senses that receive impressions from bodies at a distance, are also the only ones which are susceptible of being deceived by illusions; because, in fact, the fragrant molecules of bodies, the sonorous waves of the air, and the rays of light can experience, in their external course, various deviations or modifications, producing false impressions and fallacious sensations.

One would suppose *a priori*, that there is a structural difference in these nerves, since they are employed in such widely different functions, and convey so very different impressions, such as those of vision and hearing. That there are differences, we are very sure; but in what they consist, we know not: except that we can perceive some little dissimilarity of appearance and consistence, which in no way resolves the difficulty. It has pleased the Creator to impart to the nervous expansions of different parts, different faculties; but why the optic nerve solely should be capable of transmitting to us perception of sight and not of taste; and why the faculties of the auditory nerves should be exclusively appropriated to hearing rather than to taste, is an ultimate fact beyond human knowledge, which it is impossible for us to comprehend or elucidate.

All that we know on this subject resolves itself into this, that the Creator has chosen to implant peculiar faculties on particular parts, and to connect with them certain varieties of structure and appearance; but there is no reason, except his *fiat*, that the skin should not see, and the ear smell and taste. We shall now proceed to give some details of the individual organ of the sense of hearing.



## SENSE OF HEARING.

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HEARING is the sense destined to make us acquainted with sounds. Its study, like that of the sense of sight, is divided into three parts: namely, 1st, The physical history of sound, or the exterior excitor or agent which produces the impression; on this is based the science of acoustic, which in reality is a part of the science of the motion of bodies. 2nd, The anatomical structure of the organ; and 3d, The mechanism of hearing.

### FIRST—SOUND.

When a body is percussed or struck, there occurs in the molecules or particles composing it, vibratory motions which gradually diminish as they extend from one body to another, like the concentric waves produced by throwing a stone into a collection of water, and at last stop.

These oscillations are immediately experienced by the surrounding air in contact with the body, and are propagated from stratum to stratum of the atmosphere, to a certain distance; this quivering or vibration is at last communicated to the ear, and there produces, first an impression, and then a sensation, as we shall see hereafter, which we call *sound* or *noise*.

In the sense of hearing, the exterior excitant is not then the sonorous body itself, as in the case of touch; it is not even one of its integral molecules, as in the sense of *taste* and *smell*; but it is the air repeating merely the vibratory movements which the sonorous body experiences.

There is no doubt that this is the manner in which sound is produced and propagated; for we may demonstrate the molecular oscillations both to sight and touch, either by striking a bell, or causing a string to vibrate. These sonorous oscillations are confined to the molecules of the body—for often a whole body may be put in motion, without, on that account, any sound being produced; as, for instance, by letting go, to their natural elasticity, the branches of a pair of forceps, having previously approached them near each other.

In every sonorous body, we must especially consider its elasticity as its moving power. A sonorous body may be elastic by *tension*: such bodies, when they have only a linary direction, are called *cords*, as we see in all stringed instruments; but when they are spread out into membranes, they are then called a drum, or a tympanum; the ear of animals is of this category. A sonorous body may be also elastic from the pressure of the air; such are all wind instruments in which the air is retained a longer or a shorter space of time, according as it lets out the air at one or the other keyhole. Lastly, a body may be sonorous through its hardness. (The bones in which the ear is lodged are the hardest in the body.) They may be of different description; they may be linary, like

metallic rods: or membranous or extended, to which class belongs windowglass, bells, tumblers, &c.

Every thing that compresses the molecules of a body, causes the vibrations whence results the sound. In consequence of their elasticity, the molecules tend to return to their place and respective relation; and in order to resume their primitive station, they undergo a series of oscillations, like a pendulum set in motion—at first, very extensive, and gradually becoming less and less so until they entirely stop. We may, on the contrary, deaden, or stop the oscillatory movements of bodies, by placing our hand or a piece of cloth on them.

The *harder* and the more *elastic* a body is, the greater the rapidity of these oscillations. We cannot precisely determine what are the physical qualities that render bodies sonorous. We have reason to suppose that the qualities just mentioned, are useful, and we know, also, that generally, the sound produced by a body is in the same ratio of its hardness and elasticity. However, it is as difficult to say positively, what are the qualities or properties that make a body *sapid* or *odoriferous*, as to say what makes a body sonorous.

But these vibrations or oscillations, whence results sound, are susceptible of great differences with respect to *extent* and *number*, in a given time, or their *rapidity*.

On these differences depend two of the particular qualities of sound—*strength* and *tone*—and on which, indeed, music is based as a science.

1st, *Strength*.—The strength or weakness of a sound depends upon the *extent* of the oscillations that the molecules of sonorous bodies experience. A sound is said to be strong or loud when these oscillations are extensive, and feeble or weak if the contrary occurs.

This is exemplified by a violin's string; in this we perceive that the sound becomes feebler in the same degree as the amplitude of its oscillations diminish. There is no end to the different degrees of feebleness or strength of sounds.

2nd, *Tone*.—The tone of a sound is, on the contrary, owing to the *rapidity* of the oscillations, and to their number in a given time, whatever may be the extent of these oscillations; in other words, the feebleness or strength of the sound.

If we suppose a wheel striking on a quill as it turns, by moving it slowly we shall hear every stroke, but if turned fast, we shall hear a continuous sound which is the *tone*; and as the wheel is turned with different degrees of velocity we shall produce different *tones*.

The same is the case with respect to a violin's string, and which will yield, when touched, its tone, according to the degree of force with which the bow is carried over it.

The *timbre*, as we shall see, is peculiar to the quality of the sonorous body, and has nothing to do with the rapidity or extent of the oscillations of bodies. This quality enable us to distinguish the sound of a piece of copper from a silver one.

The tone is said to be *grave*, if the oscillations have but little rapidity, and their number small in a given time: it is *sharp* or *acute* under contrary circumstances.

Every kind of movement possible is either straight, curviline, or vibratory. This last kind of movement when sufficiently strong and sufficiently quick to act on our auditory organs, constitute a sound.

The *gravest* sound we can appreciate, is that which results from thirty-two vibrations in a *second* of time; and the most *acute* or *sharp* sound is that which results from 8,192 in the same space of time.

All the appreciable *tones* are within these extremes: below and above them, what we hear is mere *noise*. There is, in fact, this difference between *sound* and *noise*: the first is produced by permanent and regular oscillations that the ear is fully able to appreciate; while the second is the result of undulations which are irregular, not permanent: formed of a multitude of confused sounds, which, therefore, have no distinctness, and which the ear cannot appreciate. The most untutored ear can distinguish noise from musical sound: in fact, we know rather what noise is not, than what it is. Its analysis is next to impossible. To analyse, for instance, the *hum* of a crowded assembly and wish to discriminate the quality of sound emitted by every individual voice, would be as difficult a task as to analyse a heterogeneous mass composed of substances in different proportions. While, on the contrary, musical sounds may be distinctly apprehended, although the individuals singing may be many; still an exercised ear will be able to ascribe to each the sound that he emits. This is exemplified in a musician being able to detect, in a large and numerous orchestra, an instrument or voice playing or singing out of tune. In the same manner it would be comparatively easier for a chemist to analyse a compound body in which the proportion of each substance should be previously known as to its harmonious component parts.

Understanding now, that all continued uniform sounds are produced by a repetition of similar beats or vibrations, we easily perceive that in the series from grave to sharp, there must be such as, with respect to the number of beats in a given time, are related to each other as 1, 2, 3, 4, &c.; or, which is the same thing, as 10, 20, 30, 40, &c. Now, as between two sounds, one of which has 20 beats, while another has 10, there must be a coincidence at every second beat of the quicker, or the one striking 20.—And between sounds whose beats are to each other as 30 to 40, there must be a coincidence at every third beat of the quicker.

We should naturally expect the ear to be differently affected by such correspondence, than when the coincidence is either less frequent or is irregular. Accordingly we find that all sounds which have simple relation to each other, are remarkably agreeable to the ear, either when heard together, or in close succession; while those in which the coincident beats are farther apart or meet irregularly, are heard with indifference, or are felt to be positively harsh and disagreeable. In fact these latter combinations of beats approach more to the character of methodical *noise* than *music*.

The most striking and prominent character of the musical productions of the German school of the present times, is the continual recurrence of these far fetched sounds, unpleasant to the ear; while the character of the productions of the Italian school is those nice and delicate near coincidences of sounds most pleasing to our ear, by discarding every discordant combination. The latter, generally, take the ear and the soul for the guide of their composition, while the former follow the *dry rules* of a science, which being intended to please the ear, merely satisfy the mind of the composer, and not the generality of hearers. Hence, many of the German school find fault with Italian music and affirm it not to be *scientific*, as though the perfection of the combination of sounds was not to please the ear, but to produce a harsh and shocking coincidence. We might just as well call the perfection of painting the school that should teach, that the more the colours are glaringly in opposition to each other, the greater the effect must be, and the greater the pleasure

of visual sensations. But, we will ask, does nature produce these glaring oppositions? She seldom indulges in glaring oppositions or rapid transitions from one thing to another. Examine the most brilliant flower, or insect, or bird, or sky, or even the *iris*, and you will see that nature does not pass suddenly from one colour to another, but melts, so to say, two or three hues together to form a neutral one. If the parrot seems to form an exception, with respect to the hues of its plumage, he is also preëminently distinguished for the harshness of his notes.

The *hum* of the woods, which is the rainbow of sound, and the *Æolian* harp, the Newtonian prism of sound, do they produce these discordant and harsh notes? On the contrary, they create the most pleasing combination and succession of harmonious vibrations that the ear has ever listened to, or fancy, perhaps, conceived.

After a pause, this fairy harp is often heard beginning with a low and solemn note, like the bass of distant music in the sky; the sound then swells as if approaching, and other tones break forth, mingling with the first and with each other in sweet concord and harmony. In the combined and various strain, sometimes one clear note predominates and sometimes another, as if single musicians alternately led the band, as is the case in an orchestra in which various instruments sing successively parts of a melody or the same melody, while the remainder of the orchestra is subdued into an accompaniment; and thus the aerial concert often seems to approach, and again recede, until, with the unequal breeze, it dies away, and all is hushed again. This is the music of nature. There is also music in the songsters of the grove; there is music in the rustling of leaves, in the humming of insects, the murmur of streams, the crash of water falls, and the roar of the tempestuous ocean. The voices of many animals, and of man especially, are capable of producing by speech, or modulated sounds, the music of nature.

We spoke just now of *neutral colours*, the production of nature; there is, also, a sort of *neutral sound*, and this is produced by the coincidence or double pulsations of any two concordant sounds becoming the element of a third sound, which is always with them, and is called the *grave harmonic*. This is exemplified by the ringing of two bells.

Although all the comparable musical sounds be included as a mean term, between these two extremes, 32 and 8192 vibrations, nevertheless the most delicate ear cannot appreciate them all; the more delicate inflections or modulations escape the apprehension of our hearing; and the number of intermediate tones between the gravest and the most acute, is not so great as one might be disposed to think. This extent contains about eight octaves, in each of which there are *seven intervals, notes, or sounds*, designated, at first, by the letters of the alphabet, to which, afterwards, the well known names of do, re, mi, fa, sol, la, si, has been given, and which constitute what is called a gamut. The human voice has been taken as the standard or measure to form the octave, and that is, where the voice seems to break in its ascension from the grave to the highest uttered note at one breath. The divers instruments of an orchestra, beginning at the lowest or contra bass and terminating at the highest, or the instrument called the octave flute, have different ranges in these eight octaves, which dovetail, as it were, into each others as they run from the lowest to the highest octave. The organ alone embraces them all in its range of sounds.

Then there is a wide difference between the *tone* of a sound and its *timbre*; the *tone* being produced by the *rapidity* of vibrations in a given

time, while the *timbre* belongs to the quality of the body producing the sound. Thus an ivory comb produces a tone in a given time and rapidity; but let it be made out of silver instead of ivory, and although we shall produce the same *note* or *tone* by passing our nail on its teeth with the same rapidity, still the quality of the sound will be different.

Thus the difference of the materials composing the great variety of instruments, produce the difference of their more or less pleasing quality. The same is the case with reference to the voice of man or woman. It is not because a voice is high or low, or sharp or low, that it is pleasing, but because its *timbre* is of a good quality.

The *timbre* of the best voices or instruments may be perverted by the performer's bad taste, or for want of proper instruction. Most authors ascribe this quality to the peculiar nature of sonorous bodies. Mr. Biot thinks that it appertains to the *harmonic sounds* which always accompany a fundamental one. To illustrate the idea:—if a long musical string be made to sound, and the number of its vibrations in a given time be ascertained, we find that half of it, used as a whole, will vibrate twice as fast; a third part, three times as fast; a fourth part, four times as fast; and so on, producing the sounds or tones most nearly related to each other. A very fine illustration of this is afforded by the string of a violincello, when made to vibrate by moving a bow very gently across it, near the bridge; there are then heard, not only the sound or note belonging to the whole length of the string, but also, more feebly, the subordinate notes belonging to its half, its third, its fourth, &c., beautifully mingling with the first sound or fundamental sound, and forming with it a rich combination or harmony. Often, in such a case, the subordinate sounds swell with such force as to overpower, for a time, the fundamental note; and then, if the string be carefully examined, it will be found to be vibrating, not as a whole, but in two, three, or four distinct portions, with points of rest between them, on which points little bits of paper thrown, will remain, but will be shaken off from every other part. The same harmonic sounds may be produced while drawing the bow across the string, by touching the string lightly with the finger at the points where we wish it to divide. It is in this manner that harmonic sounds are produced on the harp, guitar, violin, &c.

But in order that the vibrations produced by the sonorous body may be perceived, it is necessary that an intermediate body should repeat and transmit them to the ear. This is called the *vehicle* of sound. Air is generally the vehicle: but water and all the elastic solids may also communicate sound.

If a clock strike, when placed within a glass bell or receiver, exhausted of its air, the strokes are not heard; but if a wire be attached to the clock and brought out of the exhausted receiver, and then put to the ear, we shall hear the clock strike distinctly. Mr. Deleau has proved that deafness is, in many instances, owing to a vacuum produced in the cavity of the ear.

Mr. Biot has proved, by actual experiment, that if the column of air, which is the vehicle of sound, moves in one direction only, the transmission of sound is made at a greater distance. Thus by speaking in a whisper at the extremity of a cylinder of 951 fathoms long, in the aqueduct under Paris, he has heard distinctly at the other extremity. In this transmission of sound by air, it only loses its power in an inverse ratio of the square of the distance; but the *tone* and *timbre* do not change. The speaking trumpet is based on this acoustic principle.

The pliancy and readiness with which air receives and transmits all the various inflections of sound, is really worthy of remark. It not only repeats every sound, but it transmits several at a time without confounding them, although they may differ in power, pitch and timbre. Thus an experienced musician may distinguish which instrument is out of tune, or does not play correctly in a full orchestra.

The sound is the more powerful the denser and warmer the air is. Thus in a cloudy day sounds are louder than in a clear one. Sausure relates that the report produced by the firing off of a pistol, while on Mount Blanc, where the air is uncommonly rare, was not greater than a common Chinese cracker.

The rapidity with which the sonorous undulations of the air are communicated through ærian molecules is immense and really astonishing. It has been reckoned at one hundred and seventythree fathoms in a second of time, according to some experiments made near Paris ; and, according to English experimenters, sound travels eleven hundred and fortytwo feet in a second, or about a mile in four and a half seconds, or thirteen miles in a minute. Its velocity is the same whether it is strong or feeble; the sound of the human voice, or the report of a cannon; but in summer, when the air is not so dense as in winter, sound travels rather more rapidly ; so it does in elevated situations ; while in cold foggy weather its progress is retarded. The difference in no case is, however, more than a few feet ; and in a denser atmosphere, though the progress of sound is impeded, the same sounds are stronger than in thinner air; still there are many deaf persons who hear better in a clear dry atmosphere, than in a damp heavy one. This may be the reason why sounds are heard better at this season. When the earth is covered with several feet of snow, as was the case in the winter of 1830, the same sound is not half as strong. The snow prevents the vibrations of surrounding bodies, and it acts like the damper of a pianoforte.

Our own pulse may be used as a measure of time. If we can see the flash of a cannon and count the pulsations between the flash and the moment when the report reaches our ear, and allow one thousand feet for each pulsation, we shall come very near the truth, as to the distance at which the cannon is from us.

The *tone* of the sound does not influence its rapidity ; for Mr. Biot had a person to play an air on the flute, at one extremity of the cylinder just mentioned, nine hundred and fiftyone fathoms long, and he, being at the other extremity, heard it very distinctly ; which proves that the various *tones* had been propagated with equal swiftness.

The disposition of the places traversed by the sound produces several phenomena.

If the undulations of the air conveying a sound meets with a resisting surface, the sound is reflected in such a manner as to form an angle of reflection equal to that of incidence, and situate in the same plane. If the reflecting surface is sufficiently distant, so that the ear may have the time to receive the direct sound before the reflected one may reach the ear, then the same sound is heard twice, and there results a repetition of sound, called an *echo*. It may be double ; that is to say, the first reflected sound may be again reflected so as to be each time heard separately.

This phenomenon has been observed in a great many parts of the world ; but one of the most remarkable is the famous *echo* at the Marquis Simonetta's villa, near Milan. It is produced by the reflection of sound between the opposite parallel wings of the building, which are

fiftyeight paces from each other, without any windows or doors and perpendicular to the main body of the building. The repetition of the sound dwells chiefly on the last syllable. A man's voice is repeated above forty times, and the report of a pistol above sixty times; which proves the difficulty of propagating human speech or voice; while mere sound or noise is prolonged and heard more distinctly.

A curious example of an oblique *echo*, not heard by the person who emits the sound, is described in the Memoirs of the Academy of Sciences, as existing at Genefay, near Rouen. A person singing, hears only his own direct voice, while those who listen hear only the echo, which sometimes seems to approach, and at other times to recede from the ear; one person hears a single voice, another several voices; one hears the echo on the right, and another on the left—the effect constantly changing with the position of the observer.

A very curious echo is also described to exist in Argyleshire. When a person plays a few notes on a trumpet, they are correctly repeated, but a *third lower*; after a short silence, another repetition is heard in a yet lower tone, and after another short interval, they are repeated a *third time in a tone lower still*.

Thus the air has the power of repeating the oscillations or vibrations of sonorous bodies, and of propagating them. Sound is diffused in straight and diverging lines, called sonorous waves; and the movement is the more intense, the nearer we are to the sonorous body.

Air, as we have already remarked, is not the only vehicle of sound; liquids and solids are equally so. Nollet, Dr. Franklin, and many others, have convinced themselves that they could hear under water. Every man who has ever swam, remembers that when a boy, if he ever dived, to have heard every kind of sound above water, as well as the noise made by striking two stones together, although the sound is slightly muffled. It is also well known that fish will draw near a boat in which any musical instrument is played, or be frightened by the noise made on board a ship.

So, likewise, every solid body, whose molecules are sufficiently elastic, to receive and transmit vibratory movements, is likewise a vehicle of sound.

It is well known that the least noise made at one end of a long piece of timber, is distinctly heard at the other extremity, while it is not heard by means of the air.

Soldiers know very well how to detect the approach of cavalry, by placing their ear in close contact with the ground, while they could not hear it standing.

Mr. Tanner, in his "narrative," mentions the fact of his hearing, when applying his ear to the ground, the noise that herds of buffaloes made at the distance of ten and twenty miles, so as to distinguish the direction of the sound, and the situation of the herd across the prairies, although they could not be seen from the commanding eminence where he was, or heard, whenever he stood or did not apply his ear to the ground. This same fact was testified by a number of persons who were with him at the time.

Mr. Hassenfratz has established by actual experiments, that in the subterraneous passages under Paris, that the sound resulting from the percussion of the wall of the passage, arrived sooner by the medium of the *wall*, in contact with which his ear was placed, than through the medium of the surrounding air. It is true that through the medium

of the *wall* it arrived sooner, but the sound was proportionately weaker. The same result was obtained by Mr. Biot, on the metallic aqueducts of Paris.

We have made several patients hear our voice, who could not hear the firing off of a four-pounder, even when close, by putting a rule of wood between the patient's teeth and our own, and when in this situation speak, and to the astonishment of the patient, he heard our voice, although he could not distinguish the words. I have performed the same experiment with four or five pupils of the deaf and dumb institute, and made them hear my voice distinctly, although the sounds or words to them conveyed no idea.

The rationalis of this phenomenon is this: my voice striking against the rule, communicating the vibrations of the air first to the rule, then to the teeth, and thence to the whole bony structure of the head, in one of which bones is situate the organ of hearing; and thus the oscillations are conveyed from one solid body to another, until it reaches the nerves of the ear themselves.

Mr. Savart's experiment is a very positive and curious one, with respect to the power possessed by bodies whose molecules are in motion, to set other bodies also in motion, by the medium of the air. He placed several little membranes with some sand on them, and the membranes, as well as the sand, moved in unison with the sounding body. Moreover, the particles of the sand placed themselves in a regular form, according as the sound reached the membrane on the one or the other side.

Such is the long, although abridged, but we believe interesting, history of the laws of the propagation of sound.

There is a substance which has the singular property of destroying colours as well as odours; this is the chlorine gas. It is the universal *bleecher* and purifier, for it will remove every kind of vegetable colour, and destroy every kind of odours except its own, which is to odours, what white is to colours, that is, a negative state, or an absence of colours or odours.

We do not know if there exists in nature an annihilator of sounds, as there is one for colours and odours; if we except, however, the state produced by placing a sounding body within the receiver of an airpump, and exhausting the air therein contained: which process prevents the sounds produced by the body thus situated from reaching us. But we conceive that a vacuum is rather interrupting the means of communication, than an annihilation of sound: for as soon as the air is again permitted to enter the receiver, the sounding body is heard to sound louder and louder, in proportion to the greater quantity of air admitted in the receiver. It would be a subject curious to ascertain, and might throw some light on the causes of *total deafness*. Dr. Deleau has ascertained that a *vacuum* formed in the cavity of the tympanum produced total deafness. We have used the chlorine gas in certain cases of deafness, but we have found that it is not an annihilator of sounds; on the contrary, several individuals have been greatly benefited by its use in certain cases.

The absence of sounds is designated by the name of *silence*. Its effects on the physical and moral constitution of man have a very great analogy with those of obscurity or darkness. It results from the privation of one of the natural excitants or stimuli of the economy. Like *obscurity*, *silence* disposes man to sleep and repose; it naturally

invites him to musing and meditation, by isolating him almost of every surrounding object; it imparts to the mind a certain propensity to melancholy, and, if prolonged, it may render man hypochondrical. This is always the case with deaf persons whose deafness has been of a long standing.

By *silence* the sensibility of the ear is exalted, as obscurity exalts that of the eye. This is exemplified by those persons who have long been confined in obscure and solitary cells—as in solitary confinement.

The perception of *too* intense a sound, like that of *too* bright a light, produces an undescribable unpleasant feeling, pain, and headache. These effects vary with the degree of sensibility or irritability of the subject. Musicians with nice feeling are generally very irritable when they hear discordant sounds or much noise.

Sounds extremely *acute*, such as that of a sharp, sibilating *whistle*, or the Chinese *gong*, have, more than any other, the power of strongly exciting an individual, even to produce a fit of anger or even convulsions. Who has not felt the desire of placing his hands over his ears when such sounds are heard? On the contrary, *grave* and *monotonous* sounds produce the reverse effect, which very much resemble that of silence. They, like silence, bring on stillness and sleep. They have even a more marked influence; for silence does not provoke sadness and melancholy so readily as *grave* and *monotonous* sounds. Who, finding himself benighted in a dark and solitary ancient forest, and all at once, when journeying on, hearing the din of the monotonous clock of the neighbouring solitary convent, has not felt a thrilling sensation creep all over his body, and a sad indescribable feeling pervading his mind, as if the universe did not exist; the monotonous sound not announcing us “the knell of parting day,” but the darkness visible of sounds. sufficient merely to tell us that we barely exist.

From this faculty of sounds of moving the soul to *lively*, or *angry*, or *pleasing*, or *melancholy* sensations, the art of music owes its origin.

The art of music has then for its object, the combination of these sounds, so as to produce, in the most complete and efficacious manner, this result, and of producing at pleasure, sad or pleasing emotions.

Its marvellous and enchanting power is well known. It must be felt, it cannot be described; and woe to him, “who has no *music* in his soul, or is not *moved* with concord of sweet sounds.”

From what we said in the preceding pages, we can draw the following conclusions or nine propositions which constitute the acoustic theory.

1st. The principal properties of sounds are in strict relation with those of light.

2d. Sound directs itself on all sides by irradiations from the sonorous body.

3d. It, like light, is reflected from the surface of bodies under equal angles.

4th. *All solid bodies* are more or less sonorous, but with equal *density*; it seems that they are so much the more so, in proportion to their greater *elasticity*.

5th. The more the *vehicle* of sound is dense, the farther the sound is heard.

6th. The *strength* or *weakness* of sound depend upon the *extent* of the vibrations of sonorous bodies, which is in a strict relation with the power of impression or impulsion caused on the sonorous bodies.

7th. The *tone* of a sound is owing to the number or rapidity of vi-

brations in a given time. On this proposition is based the theory of music.

8th. All sonorous bodies have a tendency to put themselves in unison with the vibrating bodies while in the same medium.

9th. That the quality of sound of different sonorous bodies, called *timbre*, entirely depends upon the nature of the body, and cannot be explained.

From this, we conclude, that the organ of hearing will be the more perfect, the more it will be able to appreciate feeble sounds ; that it will be able to distinguish or discriminate between every kind of sound or *tones* and their *intervals* ; and that it will be capable of collecting a greater number of sonorous rays and conveying them towards the organ.

## ORGAN OF HEARING.

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It is situated on the sides of the head, and the farthest removed from the medium line, if we except *touch*, and at the base of the cranium. It comprehends: 1st, The *auricle* or *external ear*, the part which is visible; 2d, The cavity of the *tympanum*, or *mean part*; 3d, The cavity of the *labyrinth* or *internal ear*, which is the most deep seated, and the most important part of the whole organ.

### FIRST—AURICLE.

It is composed of the ear, properly so called, a kind of acoustic anfractuous conch, composed of the external skin of a fibro-cartilage, which imparts to it its form, and of several intrinsic and extrinsic muscles, which in man are scarcely ever used, but very much so in the horse, rabbit, sheep, &c.; then, we have the *meatus auditorius externus*, ten or twelve lines long, and having several curvatures, existing in all animals that have this passage. It extends from the bottom of the conch to the cavity of the *tympanum*: it is formed of a bony portion of a fibro-cartilage, and of the skin; which last, in this place, is furnished with follicles very much developed, which are called *ceruminous*, because of the waxy humour they secrete.

The cerumen, by its bitter taste, seems to be destined to prevent insects from lodging themselves in this passage. However, insects are known to have hatched their eggs in this part of the ear, in persons particularly who have any discharge of matter, and thus producing immense maggots and the larvae of true insects.

As to the use of the external ear, opinions are very much divided. It is, however, generally supposed that it has the power of collecting sounds in the manner of an acoustic trumpet, and reflecting them on the membrane of the *tympanum*.

But Mr. Itard, a great authority on this subject, opposes this opinion, and says that it is not true that the want of the auricle induces hearing to be impaired. He moreover adds, that many animals, which have a very nice ear for the apprehension of sounds, have no *auricles*, such as birds, the mole, &c. and that those animals which have one in the shape of a *cornet*, as the horse, dog, sheep, &c. it is more for the expression of the animal, than for the uses of hearing, as we all know that a horse does not turn his ears towards the sound, but simply pricks them.

But we beg to differ with Mr. Itard, notwithstanding all these strong points of analogy we have adduced; and we firmly believe the auricle indispensably necessary to perfect hearing in those animals which have one, although not indispensable to enable the animal to hear.

Hence, we daily see persons hard of hearing, placing their ear in

advance with their hand, in order to catch a greater number of sonorous waves. This motion is instinctive with every one, not the result of education, and therefore there is something more in it than Mr. Itard would make us believe. Mr. Savart justly considers the auricle as an apparatus intended to repeat the sonorous vibrations, and which transmits sound to the membrane of the tympanum, as much by the oscillations of its own structure, which is both solid and elastic, qualities indispensable to sonorous bodies, as by those of the air which traverses it.

Secondly, *The cavity of the tympanum* is an irregular cavity within the base of the petrus portion of the temporal bone; exteriorly, it is divided from the external conduit by the membrane of the tympanum; within, it communicates with the internal ear, through two openings, the foramen ovale and the foramen rotundum, which are covered over with a dry, vibratory membrane, similar to that of the tympanum; below, is observed the glenoidal fissure, through which passes the anterior muscle of the malleus and its larger apophysis; posteriorly, several little holes are observed, which communicate with the mastoid cells; finally, anteriorly, it presents a bony and cartilaginous canal, which opens at the superior and lateral part of the pharynx, and permits it to communicate with the external air, called the *Eustachian tube*.

The cavity of the tympanum, continually filled with air, lined by a thin membrane, is crossed by a chain of four small bones, articulated with each other; moved by peculiar muscles, the whole acting on the principle of a lever, extending from the membrane of the tympanum to that of the foramen ovale, of which they influence the different degrees of tension. These bones are the *malleus*, the *incus*, the *orbicular*, and the *stapes*.

Thirdly, *The internal ear or labyrinth*, comprehends three cavities, which communicate with each other: 1st, *The vestibule*. This is a spheroidal cavity situated between the cavity of the tympanum, and the passage where the auditory nerve enters. We remark in it seven apertures; 2d, *The cochlea* is a very hard bony cavity divided into two spiral canals, and supported by a central cone of bone, called *modiolus*; this latter is perforated by numerous little holes, through which penetrate a part of the auditory nerve. There are two scalæ; the external opens into the *vestibule*—the internal communicates with the foramen rotundum: hence, *scala vestibuli*, and *scala tympani*. 3d, *The semicircular canals* are three in number, and open into the vestibule by five orifices.

All these cavities are lined with a thin membrane, which exhales a still thinner and transparent fluid, called the humour of *Cotugno*, and which receives the ramifications of the *portia mollis*, or the auditory nerve. This nerve arises from the *restiform* body, a part of the superior portion of the spinal marrow, and enters into the organ through the internal passage.

## MECHANISM OF HEARING.

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THE ear, properly so called, by its excavations, gathers the sonorous undulations, and directs them towards the auricular canal. In this first passage, the sound is united into a focus; and, for this reason, it augments in intensity; it follows the auricular canal, and soon reaches the membrane of the tympanum, to which it communicates its vibrations; this latter being thin, dry, elastic as the head of a drum, and consequently well calculated to repeat the sonorous waves, transmits them to the internal ear by three several means, namely: the chain formed by the *small bones*; the *walls of the cavity* of the tympanum, which are elastic; finally, and especially, *the air* which fills up this cavity. Then the membranes of the *foramen ovale* and *foramen rotundum*, and of the vestibule, which are dry and vibratory, like that of the tympanum, participate in the oscillations, and transmit them to the *lymph* of *cotugno* contained in the different passages of the labyrinth. Finally, this humour presses vibratory sonorous waves against the nervous expansions which float in its interior, and the impression which they receive is, lastly, transmitted through the acoustic nerve to the sensorium commune.

The experiments of Mr. Savart are a positive demonstration of the effect of the sonorous waves or undulations on the membrane of the tympanum.

Sound, sometimes, does not follow the course which we have just indicated. For instance, when stopping our ears, we still hear the tickling of a watch placed between our teeth; the sonorous undulations are then communicated by the bony structure of the cranium to the acoustic nerve, solids being, under certain circumstances, excellent conductors of sound.

Such is, in an abridged manner, the physical history of hearing; beyond this, we have no positive knowledge.

But physiologists wished to give more precision, and describe in a more special manner the part that each portion of the ear acts; we shall see, while examining the principal hypotheses, that they are far from having thrown any light on this phenomenon.

Dumas considers the membrane of the tympanum as being formed of concentric curved lines, which have the property of vibrating each in a particular tone; and others have advanced that the difference of tones results from the different degrees of tension of this membrane.

We have had under our care several individuals who were deaf, and in whom this membrane was wanting; but, after the true cause of deafness was removed, the patients heard perfectly well every *tone* or spoken language, without having recovered the membrane of their tympanum. So that these facts do away these hypotheses of Dumas and others.

As to the small bones, it has been presumed that they strike on each other, or on the membrane of the tympanum only; hence their names of *hammer* and *anvil*. We conceive that such hypotheses do not deserve to be repeated. Besides the use which we have already assigned to them, it is generally admitted that they modify the degrees of tension of the *membrane of the tympanum*, and of the membrane of the *foramen ovale*.

Their anatomical structure; their articulations; their muscles intended to move them, are the best proofs of the movements they must perform, and of their being thus used.

Some physiologists have supposed that the *Eustachian tube* permitted sonorous undulations to pass, instead of being singly a passage for the air to enter into the cavity of the tympanum. This may be immediately disproved by placing a watch in the mouth so as not to touch any solid part, in which case the tick of the watch is not heard; but if the watch be permitted to touch the teeth, then it will be heard, and that through the continuous connexion of solid bodies which are conductors of sounds.

What, you may ask, is the use, then, of these bones, and of the membrane of the tympanum? Why, you may also ask with propriety, should *nature* bestow upon our species so very delicate and complicated an apparatus, if we may hear just as well without it? We understand the import of such questions, and cannot deny their force; but we shall remain satisfied with the facts we have observed, and shall not try to explain what we conceive is, till now, above the comprehension of every human being.

The case of *Elizabeth Care*, who had lost both the membranes of the tympanum, and all the small bones, as well as the case of *Mr. Beauregard*, who also has lost the same parts, and both these individuals still hearing perfectly the human voice, or any other sound, are, to us, obvious proofs, that the proper, and indispensable part of the organ of hearing is the labyrinth and acoustic or auditory nerve.

This we observe to exist in some animals where there is no auricular or introductory tympanum; no bones of the cavity of the ear; but the undulations of the air are received at once on a membrane which communicates them to the labyrinth, and thus to the nervous expansions of the auditory nerve.

If, however, in man, or those animals which have a tympanum, the last bone of the series—the stirrup—is lost, the membrane covering the oval hole will be generally destroyed also; and as the fluid contained in the inner ear (*the lymph of Cotugno*) will, in consequence, escape, deafness will ensue, from the medium being lost, by which the immediate organ of hearing becomes affected. The same thing happens whenever the membrane of the round hole is destroyed.

The immediate function of the organ of hearing is, as we have already stated, to give us the sensation of sounds; but its mediate functions being more closely connected with, and serving more intimately, the mind, than those of taste or smell, has caused this organ to be placed on a par with touch and sight.

We may, in fact, by means of hearing, ascertain the nature of bodies; the situation they occupy; the distance at which they are placed; the direction in which they move, &c. This sense, moreover, assists the intellectual faculties, those of *music* and *language*, for instance, without which, they can no longer be exercised.

Metaphysicians, struck with its great utility, in the exercise of these faculties, have exclusively ascribed them to this organ.

There is a great deal of difference between that power of perception, which constitutes hearing, and that which is connected with the appreciation of musical sounds. For if the faculty of combining sounds according to harmonic relations, and so as to constitute *music*, be the mere product of the sense of hearing, then this faculty ought to be possessed by all animals, and by every man in the same ratio with the perfection of the structure of their ears. This, however, is not so. Many animals hear better than man, and, nevertheless, none possess the faculty of music to the same extent. No relation is observable, in animals, between the power and character of their music and the perfection of their hearing. For instance, the birds which do not sing have as nice an ear, with respect to mere hearing, and some even more, than the singing birds.

Again, among the singing birds, often the male alone has this instinct of pouring forth their strain. Many of these singing birds sing only at certain periodical seasons. Shall we say, in this instance, that they are, all at once, excited at this period, or periodically endowed with this faculty, and afterwards fall again into the same apathy, although the ear of these animals remain the same at all times?

The ear of all birds is nearly constructed on the same plan. They have no external ear or auricle; the cavity of the tympanum contains only *one bone* instead of *four*, as in man; and the cochlea is a cone slightly curved. Notwithstanding this very great similarity of structure, each one of them has preserved, ever since the creation, its peculiar note, or series of notes, and has acquired no others. There is, however, an exception in the mocking bird.

The elephant, which has a nicer apprehension of sounds than man (as we shall prove it by an anecdote, presently) has no faculty, whatsoever, for music. The parrot, it is well known can be taught to speak any language, and, of course, must have a very nice, discriminating ear; he, however, never sings, and the tones of his voice are far from being musical.

Finally, we do not see, that in man, musical talent, or correct elocution is in the same ratio with the nicety of hearing. Men who have the most delicate hearing often cannot sing at all—Mr. Burke and Dr. Johnson are instances of it. Idiots who hear very well, cannot learn how to sing the simplest melody, or utter spoken languages intelligibly. From these facts we are inclined to conclude, that the faculty of music does not depend upon the organ of hearing solely, but is a superior intellectual endowment, for the acquisition of which the ear is merely a secondary instrument.

We might, with the same propriety, ascribe to the eye exclusively, the faculty that painters have of executing historical paintings, or in any other style, as to attribute to the ear the power of music. Then every man would be a painter; but we know that some cannot even conceive what lines represent, intended to delineate an object.

The same is the ease with *spoken* languages. If we suppose that animals have none, why then have they a hearing at all—to which metaphysicians ascribe, also, the faculty of language? Why, with the possession of this organ, they do not form a language like that of man, or something like it?

If, on the contrary, we suppose that they have a language: why, then, with an organ constructed always nearly on the same plan, are

languages in animals so different—for each one has its peculiar articulations of sounds? It may be asked, how it is that man, with the same organ of hearing has, in different countries, various languages and articulations? This is true, when he wishes to express abstract conditional ideas; but all men, however, use the same *tones* to express their passions or sentiments, which is, in fact, the natural language of man, as singing is the natural language of birds. Why has each of them its peculiar language? Finally, do we find that in man the faculty of spoken language is in the same ratio of the nicety of his hearing? Do we find that poets and orators have the best hearing? Idiots, with an exquisite nicety in hearing, can never learn how to speak or sing.

To us it is also certain, that the faculty of spoken language is a superior intellectual faculty, for which hearing is, there is no doubt, an indispensable, but secondary instrument, and destined solely to convey to the brain sonorous sensations, to which the latter *alone* connects ideas. Languages, also, follow the same progress as that of civilization, and of the ideas diffused and in circulation in a nation. Books are merely the depository of the march of mind. Oral language, and languages generally, like nations and empires, have their period of rudeness, of improvement, amelioration, and have also the seeds of decay and degradation, keeping pace, precisely, with the improvement and decline of morals or sciences; for, being the result of society, they are *man* himself, manifested in his moral capacity by these external sounds or signs. It is the index of his character and calibre of his mind; his speech or style must unquestionably unfold his cast of mind and manners, and paint the high or low origin of his sentiments. A man's works are the mirror of his soul. The more a man or nation extends his relations, the richer his language becomes; the more, also, the individuals speaking it will become polished and learned. The same is the case with respect to a deaf and dumb subject who has recovered his hearing, every new subject with which he becomes acquainted, he naturally acquires a new dictionary of words and phrases in proportion to the acquisition of the number of his new ideas. A stationary language like the Chinese, informs us, as clearly and as evidently as if we were reading the pages of its history, that its government, manners, religion, laws, sciences, and arts, are also perfectly stationary. See, on the contrary, the revolution produced in the French language by the *political* revolution of '92. Then, we may conclude, that languages are so truly the creation of the mind, that, in every nation, as in individuals, they are in strict relation with the number and character of their ideas and opinions, or, in other words, they are the true index of their mind; that, it is correct to say, that the amount of a man's knowledge is equal to his language; and it is equally correct to say, with Charles the V., that an individual is as many times a man, as he speaks different languages. Therefore, a deaf and dumb is scarcely a man. Oral language without society cannot exist in man; for all individuals who have been found wild in the forest, although their parents spoke some one known oral language, still they imitated simply the sounds of the animals which they frequented and daily heard. Monkeys, which resemble man in many respects, are not endowed, by our Creator, with the faculty of speech, and this faculty, more than any other perhaps, distinguishes man from every other animal. Thus, man alone speaks; for as to the sounds uttered by parrots, it cannot be said that they speak a language, since we know that they attach no ideas to the sounds to which they give utterance; and this, in our minds, is another proof that,

to possess the mere *oral organ*, as in the case of the parrot, or the few words that the deaf and dumb may utter, is not sufficient to say that the individual can *speak* and *think* in that language. Idiots, although they have the *oral organs* perfect, cannot speak, because they want the moving power—the mind. Also, that whenever a nation has acquired many ideas, its language becomes rich in proportion and in consequence of it. Thus, Italy, among modern nations, who, when other nations of Europe had scarcely a language, had a most beautiful and perfect one—rich in every mode of expression ; she had, also, so far back, distinguished poets and legislators, statesmen and philosophers ; celebrated historians ; painters, sculptors, architects, and musicians ; great captains ; mariners, the conqueror of a new world ; discoverer of the mariner's compass ; merchants, who exchanged the productions of the western with those of the eastern hemisphere ; who have first established banks, bills of exchange, and post offices ; who first established a militia system, tactics of warfare, fortifications, and internal improvements. And, to use the language of the Poet,

“ Birthplace of heroes, sanctuary of saints,  
Where earthly first, then heavenly glory made  
Her home ; thou all which fondest fancy paints,  
And finds her prior vision but pourtray'd  
In feeble colours,——.”

But to return. If an individual have a strong mind, thinks profoundly, and feels deeply, his language partakes of the grandeur of his thoughts, and he speaks warmly, cogently, and energetically. If, on the contrary, he want ideas and affections, he is silent, or if he speak at all, he is insipid, flat, and his language is devoid of any colouring.

Although the hearing of man has a great degree of perfection, still this sense, in many animals, seems to be even nicer in its discrimination, if we may be allowed especially to judge, in certain cases, by the size of the nerve, and the greater development of the whole organ in advance.

The ears of animals offer a great variety of structure in their details. Indeed we observe this structure to be from the existence of a mere sac, having, apparently, no nervous pulp on it, up to the complicated apparatus, such as we have demonstrated in man.

There is every reason to suppose, that, as some small animals have microscopic eyes, and possess a power of vision far beyond what is necessary to us, or what we are capable of exercising, there is, also, in many, a minute and accurate appreciation of sounds, of which we can form no conception, not until we shall find microscopes and telescopes for our ears.

Our knowledge of the comparative acuteness in the auditory faculty of animals, is not very extensive. The elephant, however, is said to be endowed with a remarkable acute sense of hearing. Its auditory organs, it is true, is larger than in other animals, or man himself ; and Sir Everard Home, while dissecting its ear, discovered that the membrane of the tympanum was muscular. Mr. Corse, who saw much of the habits of the elephant in India, states, that a tame elephant, which was never reconciled to have a horse moving behind him, although he expressed no uneasiness if the horse was within his view, either before or on one side, could distinguish the sound of a horse's foot at a distance some time before any person in company heard it.

This was made manifest by his pricking up his ears, quickening his pace, and turning his head from side to side.

He also mentions a tame female elephant which had a young one, that was occasionally sent out with other elephants without the young one being allowed to follow. She was not in the habit of pining after it, unless she heard its voice; but frequently on the road home, when no one could distinguish any sound whatever, she pricked up her ears and made a noise expressive of having heard its call. This having occurred frequently, attracted Mr. Corse's notice, and made him, at the time the female elephant used these expressions, stop the party, and desire the gentlemen to listen; but they were unable to hear any thing till they had approached nearer to the place where the young one was kept.

We shall, in this place remark, that we are able to determine the power of hearing by the distance at which a given sound, used as a standard, may be heard; this refers merely to the intensity of the sound, but we have no means of determining as to the tone and timbre, no more than we can ascertain, if we all see the same colour, possessing the same hue. We have, in fact, no means of ascertaining if all animals perceive, if not the same *tone*, at least the same *timbre*. It appears from some observations of Dr. Wollaston, that some persons are insensible to various sharp sounds, as the chirp of the house sparrow, and house-cricket; the squeak of a bat, and the noise of small insects, without having any other defect in the organ.

We have had under our care two young ladies who could hear, on the contrary, when at a distance, the voice of a bird, while at the same distance could not hear the noise made by a cart, or hear thunder itself.

If a different organization of the gustatory and olfactory nerves have made persons perceive different odours and taste in the same substance, or smell one odour and not be able to smell another, why should not a different organization of the acoustic nerve make us perceive, also, different *timbres* in the same sonorous body, or hear one kind of sound and not others? But this is impossible either to prove or to deny. These remarks especially apply to the differences we find in the sense of hearing of various men.

These differences arise, also from, 1st, the intimate structure of the acoustic nerve; 2nd, the more or less perfect structure and disposition of the parts in advance of the nerve; and, 3d, to the hygeinic precautions necessary to keep the organ in a fit state for the exercise of its functions.

Hearing is one of the senses which most enlarge our intelligence; and like all the other senses it may acquire power and perfection by practice, and we may exercise it passively or actively, that is to say, we may *hear* or *listen to*.

## HISTORY OF THE CASES.

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*N. B.—Read especially those that are marked with a Star.*

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### CASE 1.—*November 3, 1829.*

Miss Elizabeth Carr, twenty years old, of Philadelphia, with ulcers in the ear, which she has had since she was a child.—The cause of this unpleasant discharge of foetid matter could be ascribed to no one cause in its origin, if we except her lymphatic temperament, fair and delicate constitution. Now the ulcers and caries of the bones account for it. She suffers continually with headaches. Her head and eyes feel heavy. Very deaf at times. This bad case was cured in the space of four months.

### CASE 2.—*November 14, 1829.*

\*Mr. Augustus Duhamel, sixteen years old, of Philadelphia, with impervious Eustachian tubes, which has existed since he was a child.—He complains of hearing worse in the evenings and in damp weather. The air has but a slight access to the internal cavity of the ear through the Eustachian tubes. Very hard of hearing; completely cured.

### CASE 3.—*December 24, 1829.*

Miss M. Sewell, fourteen years old, of Philadelphia; sore throat and catarrh of the Eustachian tube, which have lasted during eight years.—She hears with great difficulty, even when it touches the ear, the tick of a watch, or the human voice, unless very loud and very close. She complains of a dreadful noise in her left ear, and she has from it a discharge of foetid matter. She has entirely recovered in thirty days.

### CASE 4.—*December 24, 1829.*

\*Mr. W. G. Malin, thirty years old, of Philadelphia, with obstruction and caries of the bones during six years.—We prefer to give his letter, which will be, perhaps, more satisfactory to the general reader.

*Pennsylvania Hospital, December 7, 1829.*

SIR,

As I believe the use of my right ear is now entirely restored to me, I will endeavour to give you the particulars requested. I have been sensible of partial deafness, at least, from the year 1823, and it has probably had an earlier existence, as in walking with an individual, I was con-

scious of a preference to offering the left arm ; it was not, however, until the summer of 1824 that this deafness was remarked by any other person. From that period my hearing has been in much the same state as at the time my ear was first submitted to your inspection, that is, the ticking of a rather loud watch could be barely heard at a distance of *three inches* from my right ear, and distant sounds, however loud, were scarcely distinguished by it, otherwise than as a low confused humming. On Monday, November 23, you syringed the ear and extracted some masses of cotton, or other fibrous substance, saturated with cerumen, and including particles of bone. On Saturday, November 28, you again extracted similar substances, one piece of which was so closely impacted in the bottom of the cavity, that when brought away, the sensation was as though a portion of the ear was pulled out ; immediately afterwards, I found my hearing so much improved, that the tick of the watch could be distinguished as clearly, at the distance of *three feet*, as it could be before at so many inches. On the first of December you completely cleansed the ear and removed a membranous substance from over the tympanum, which had been produced, I imagine, by the irritation consequent on the presence of so much foreign matter in the ear. I have omitted to state, that in the intervals between the operations, the ear was, by your direction, treated with the steam of hot brandy and water, conveyed to it by an inverted funnel.

In conclusion, I have to offer you my sincere thanks for this important addition to my comfort ; for you have, not only restored the use of the lost organ, but, by pointing out the true cause of the deafness, have relieved me from much anxiety and fear lest I should be deprived of the other ear also.

I remain with much respect and esteem

Your obliged

WM. G. MALIN.

Jos. TOGNO, M. D.

**CASE 5.—December 24, 1829.**

Mr. John Wood, twenty-three years old, of Philadelphia, with catarrh of the internal cavity during four years.—He became suddenly deaf from exposure ; both ears very bad at first, but in the course of two weeks, the right ear improved. During these last twelve months it has grown worse ; after a short treatment, cured.

**CASE 6.—December 24, 1829.**

\*Mr. Charles Paist, forty years old, from Charleston, South Carolina, with a catarrh of the cavity of the ear.—On his journey from Ohio to Philadelphia, he had a cold, in consequence of exposure. He only hears now the tick of my watch when touching his ears. Besides this catarrh, he had false membranes in the external passages ; removed them. Treated a few days—entirely cured.

**CASE 7.—December 27, 1829.**

Dr. Brockenborough, twenty-five years old, of Virginia ; chronic abscesses since he was a child.—Previous to consulting, has had, every time he had a cold, an abscess formed in his ears, which rendered him

very deaf, accompanied with a continual earache. This present attack has surpassed all the others in violence. Cured in thirty days.

**CASE 8.—February 25, 1830.**

Miss A. Craig, thirty-three years old, of Philadelphia; caused by scarlet fever.—She has had a discharge of fetid matter ever since she was a child. Whenever she has a cold she feels a numbness in her head, accompanied by a continual hissing sound. She can hear the tick of my watch with her right ear only, when almost touching, but scarcely at all with her left ear, even when applied close, pressing her ear. Treated three months. Cured completely, and hears as well as myself.

**CASE 9.—February 25, 1830.**

\*Mr. John Blight, forty-six years old, of Philadelphia; catarrh of the internal ear eighteen months.—A ship-carpenter of strong constitution; temperate, but subject to headaches. Cannot ascribe the cause, except to exposure. He now hears the watch only when it almost touches the ear; but hears rather better with the left. A short treatment. Entirely well.

**CASE 10.—August 3, 1830.**

\*Mr. Angué, eleven years old, of Philadelphia; chronic catarrh of the whole ear ever since a child.—He looks stupid; wants intelligence; reads with difficulty; blabbers; hears only the tick of the watch when close to his ears. After a treatment, both for his hearing and intellect, of many months, succeeded in developing both; now, he is much more intelligent, and hears very well.

**CASE 11.—August, 1830.**

\*Miss M. Angué, seventeen years old, of Philadelphia; obstruction of the Eustachian tube about eleven years.—The first symptoms of her deafness were supposed to proceed from earache, and the deafness, for a time, from heedlessness or inattention of what was said, until it became manifest that she was deaf indeed. The family physician prescribed without benefit. She only hears the watch at two inches with the right ear, somewhat less with the left. She complains of great noise in her left ear especially. Treated. Now well.

**CASE 12.—August 3, 1830.**

Miss S. Armstrong, sixteen years old, of Philadelphia, from scarlet fever ever since a child.—She has had a discharge from her left ear ever since a child. She is a brunett, and she has been always very healthy. She only hears the watch with this ear when nearly touching it, not else. After a short treatment, entirely cured.

**CASE 13.—November 18, 1830.**

Miss E. Rogers, twenty-seven years old, of Philadelphia; obstruction of the Eustachian tube, from repeated catarrhs: fifteen years stand-

ing.—She has a delicate nervous constitution. She was sickly when a child. She only hears the watch when it touches the ears. She is very subject to catarrhs in her head, and when in this state always considerably worse, and has roaring noise in her ears. She is subject to head aches. She has been in the hands of several Doctors, but derived no improvement. After several months treatment, considerable improvement. She could hear my watch at six inches distance, and must have improved still more since I have seen her.

**CASE 14.—November 24, 1830.**

\*Miss E. Coyles, aged 18 years, of Philadelphia; chronic inflammation of the cavity of the tympanum. She has had a foetid discharge from her ears for ten years to such an extent that it is intolerable to be near her. She only hears the watch when close to her ears. There is a caries of the bones about the cavity of the ear. She is stupid, and seems to have no intelligence; cannot read intelligibly from her not articulating, and not being able to modulate her voice. After six months treatment her ears were cured, her hearing restored, articulation clear, her intelligence and sprightliness wonderfully improved—she did not seem the same person. The education of her mind and her articulation have required as much of my time and attention as that of the restoration of the organ of hearing; but my success was complete.

**CASE 15.—December, 1830.**

Mrs. G. Brian, aged 35 years, of Philadelphia; chronic inflammation of the tympanum, five years standing. She is mother of several children; five years ago had a discharge from her ears, which terminated in her present deafness. She hears the watch only when applied to her ears. A part of the tympanum of the left ear was destroyed. A short treatment cured her ears, and materially improved her hearing.

**CASE 16.—December, 1830.**

\*Mrs. West, aged 34 years, of Bristol, Penn., obstruction of the eustachian tubes from ulceration of four years standing. She has been afflicted with an ulcer in her throat. After it had healed she was deaf; which state has been increasing ever since. At times she complains of singing sounds in her ears, and at others, of a kind of rushing noise, as if there was water pouring into them. She does not hear at all with the left ear, and with the right she only hears the watch when placed on the cheek bone of that side. It is almost impossible to make her hear words, however loud one may speak, unless close to her right ear, and if she closes it, she does not hear any sound whatever with the left ear. Her mind is very much depressed, and has lost all hope of ever hearing; she is subject to head-aches and to catarrhs of the nasal passages; she speaks uncommonly loud, and does not know it; she cannot modulate her voice. After a treatment of several months she hears when spoken to in a low tone of voice at the distance of four or five feet. She now hears my voice at four or five feet distance when the right ear is stopped up, when before she could not hear the loudest sounds when thus situate. This I call an extraordinary and almost unexpected result.

CASE 17.—*January 1, 1831.*

\*Master Abraham Rockhill, eleven years old. When seven years old had the measles, and in consequence of it, a puriform fetid discharge issued, for many weeks, from his nose, and soon after this had ceased a similar discharge came out from the right ear, which stopped at times after using injection of sugar of lead and rose water, but which, after a time returned. During this period he has been more or less deaf of this ear, and now he only hears the tick of a watch when one inch from it. The other ear is very sensitive to sounds, and is very acute. A very singular phenomenon has occurred in consequence of the deafness. The boy being unable to hear, when lying in bed, on his left side (being the good ear) he instinctively lay always on the side of the deaf ear, and the constant pressure on that side of the neck has stretched the ligaments and muscles of that side, and caused the antagonist muscles of the other to contract more than in their natural state, which has produced a curvature of the cervical vertebrae of the neck, and an inclination of the head towards the left shoulder, and a corresponding convexity of the neck is very apparent on the right side.

Examination of the left ear. The meatus is rather larger than the other; this is always the case when there has been a puriform discharge for years, as in this instance. It contains a little yellow cerumen and crust of indurated matter. The membrane of the tympanum is very much depressed; there is also a perforation in the anterior and inferior part of this membrane, which establishes a communication between the external meatus and the Eustachian tube, produced by the constant discharge of matter from a caries of the temporal bone, the fistulus opening being close to the membrane above, and posterior to its bony circle leading into the mastoid cells. The membrane presents a very concave surface, and presses against the small bones of the ear so as to give them the appearance as if they were protruding beyond this membrane, and must very much confine their play. This must have been produced by the constant pressure of the matter accumulating before the tympanum, it being even now pretty red and inflamed.

*Treatment.*—Washed with tepid water, the external meatus; the repeated injections brought back a considerable quantity of hard and dissolved matter. Recommended to sleep on left side. Frictions of opledoloc about the neck, and an apparatus to bend the head to the left side, when in bed.

January 2d.—Washed again his external meatus with warm water, and caused it to pass into the Eustachian tube and out through the nose and mouth. This is done by a forcing syringe, full of water, and in this manner also forcing the water into the mastoid cells, through the fistulus opening and thus washing the whole of this carious cavity. He says that he feels that his ear is more open like, and can hear the tick of a watch at several feet distance. Prescribed flaxseed tea injections into the external meatus for the present. The forcing injection of salt and water brought through the nose and mouth pieces of matter which were lodged in the different cavities.

January 17th.—There has been no discharge ever since he has been under treatment. He has had his external ear washed three times a day, and almost every day I have used the forcing injections of salt and water, which washed the mastoid cells, and the different parts in suppuration. The membrane of the tympanum, which had been entirely destroyed, except the part covering the small bones, clung together in

the upper part of the cavity of the tympanum in such a manner as to have very little, if any, motion at all, while I could see in front of it a fistulus opening leading to the mastoid cells; another, anteriorly, and downwards, and the orifice, also, of the Eustachian. Now this membrane has grown so much as to conceal the first opening, and partially the other, growing from the circumference towards the centre, the bones are very nearly, yet, in the same confined situation.

The forcing injections caused, to day, a little pain, although they found their way out through the nose and mouth without any difficulty. There is already a very great improvement, and shall expect more when the bones will be separated from each other by the growing of the membrane of the tympanum, the bones will then stand in their relative situation—and I perceive to day that there is a disposition of this kind.

February 30th.—Examined his ear and found it entirely restored; the tympanum regenerated, except a round hole in the middle, of a line in diameter. There is no longer any discharge, and with the exception of the above mentioned hole, the ear is now in its natural and perfect healthy state.

August, 1834.—I have again seen him, and every thing continues perfectly well.

#### CASE 18.—*April 2, 1831.*

\*Mr. C. Allen, thirty-four years old, from Providence, Rhode Island. When he first consulted me, could not hear a watch tick; had been in this state for eleven years. He has a sister in the same condition, if not worse than himself. He cannot hear a horse or carriage passing by him in the street, and is therefore in constant danger of being run over. The state of his mind is very low, having lost every hope of ever recovering his hearing, from the consultations he has had with the most eminent physicians of our country. As soon as I assured him that the nerves of his ear were not paralyzed, as he had been told, his countenance brightened with a new ray of hope which enlightened his intelligent countenance. He submitted to my treatment with great firmness, although, in his case, it was a painful one. The result was most cheering, and here it is. Before the treatment, could not distinguish the sound; soon after, could perceive the sound of a noise in the room, but could not distinguish the direction—for instance, he would often look at the window while it was the door of the chamber that was opened, although in opposite directions, and vice versa—thus, although the sound was perceived, could not determine the direction. Soon after, however, he no longer mistook the direction, but was very much deficient in the quality of the sounds yielded by different bodies, but by making him turn aside, and sounding every substance, his ears were soon again taught to discriminate between the sound of a silver and a copper piece, or any other substance, which proved to me that it is not sufficient to restore an organ that has long been impaired, or that has not performed its habitual functions; but that it is necessary to re-educate the ear, even after the entire and complete recovery of the simple apprehension of sounds. Soon after, he was able to carry on a conversation with his servant—a negro man—whose articulation of speech was not distinct, while placed at the distance of twenty feet, which was next to a miracle, when we consider how desperate the case was. Mr. Allen, desirous to return home to his business after only a month treatment, would go

away before I was perfectly satisfied that he would not have a relapse. I heard from him since, and he states that his hearing still keeps good.

*Philadelphia, May 6, 1831.*

SIR,

In the year 1820, I was attacked with a severe bilious fever, during which I was partially deaf in both my ears, but the right one nearly recovered its proper functions, while the left was imperfect, and gradually became worse, until about four years since, when it had so far failed as to be almost useless. About this time, the right ear began to grow worse, and continued to do so until I placed myself under your care. The symptoms have never been violent, or attended with pain, but consisted of a singing or hissing, resembling the noise from a tea kettle when it begins to boil, at the same time a distinct and very disagreeable throbbing, and a rolling or roaring sound prevailed in the head. Under these circumstances I lost all the pleasures of social intercourse, and my mind has often been exceedingly depressed by the prospect of becoming entirely deaf—a result plainly perceptible as fast approaching. Several very distinguished physicians and surgeons were, at different periods, consulted; they very quickly concurred in pronouncing a partial paralysis of the auditory nerves to have taken place, and gave me no hope of an improvement.

My situation, at length, became *very* distressing. I concluded to make one effort to get relief, and conforming to the advice of my friend, William D. Lewis, Esq., of this city, on the first of April, I placed myself under your care, and am extremely happy in being able to say that now I can hear any conversation carried on in the ordinary tone of voice, and if the voice of the speaker is clear, and his enunciation distinct, I find no difficulty in understanding what would have been entirely lost to me before you commenced the treatment of my case. There is every reason to believe that I shall hear still better when the partial inflammation, which now exists, shall have subsided.

This pleasing result has been effected by your peculiar skill in the treatment of disorders in the organs of hearing, and I shall forever feel grateful for your unwearied attention, and hope that many who now are almost lost to society and to themselves, will, by the application of your science and practice, be restored to a blessing which is not appreciated until it is impaired or lost.

With much respect, I remain,

Yours,

CRAWFORD ALLEN.

To J. TOGNO, M. D., *Philadelphia.*

**CASE 19.—January 22, 1831.**

Mr. John Lance, thirty years old, of Philadelphia, with indurated cerumen and false membranes which have existed for four years.—He is a carpenter by trade. When he exposes himself he easily takes cold, which greatly increases his deafness. About four years ago he first perceived his being hard of hearing in his right ear, and about one year afterwards he perceived the same difficulty in his left ear. Heard the watch at three inches distance with the left ear, and at eight inches with the right. A treatment of three weeks cured him completely.

**CASE 20.—March 12, 1831.**

Commodore Creighton; deaf in one ear, caused by being too near a piece of artillery when it was fired off, which produced a rupture of the tympanum and a hemorrhage in the ear. This state had lasted a great many years. He only heard the watch in contact with the ear. A very short treatment cured him completely.

**CASE 21.—January 22, 1831.**

Miss S. Powers, twenty-nine years old, of Philadelphia, with a catarrh of the internal ear, which has already lasted three years.—When she first perceived her deafness had a noise in her ears, but worse in the night. She is very subject to cold in her head, and when so she hears worse. She hears the watch at two inches with the left ear, but with the right only when it touches, and then faintly. In a short time she was restored to her hearing.

**CASE 22.—April, 1831.**

Master Alfred Sully, son of Mr. Thomas Sully, Painter; has had for many years repeated abscesses, and a continual fetid discharge from one ear, which rendered him deaf in it. The tympanum is destroyed; his intelligence is slightly affected by it; he is dull and stupid. Treated for several months and ultimately entirely cured; his tympanum partially restored, and his intelligence very much improved.

**CASE 23.—May 21, 1831.**

Miss Wymer, twenty-three years old, of a weakly, delicate constitution, and of a lymphatic temperament. She has been complaining, for six years, of pains in her head, and ears especially, and at that time she first perceived her deafness. She complains, also, of a dull feeling in them as if they were muffled up, especially in damp weather. Her hearing is worse after a fatigue. She cannot describe the various and many noises which constantly torment her in her head—so much so as to prevent her from resting. She has been in the hands of a certain Dr. Green, who has done her *no good!* A treatment of two months greatly improved her hearing, and especially her general health. Her earaches and headaches entirely cured.

**CASE 24.—May 24, 1831.**

\*Miss E. Camm, nineteen years old, of Philadelphia, of lymphatic temperament; of a morose discontented character; very irritable; always complaining of the pains she suffers in her head; dull in mind, and relaxed in her bodily powers; indeed, she has a vacant smile, which proves the emptiness of her mind, and she is very far from being intelligent. She has a difficulty of expressing her ideas by oral language. She is, however, very desirous of being treated by me, in consequence of my success with Mrs. Grant. She has been treated for her deafness by several eminent physicians, without any success. In consequence of her deafness, but more especially of the most fetid discharge of her left ear, she never was in company, or could be tolerated in a school room. Four months treatment cured completely the polypus she had

in her ear, out of which she heard nothing, but now she hears very well. The tympanum has been partially regenerated, her ear is entirely well, and there is no bad smell. She is now cheerful and intelligent.

**CASE 25.—May 27, 1831.**

Mrs. Dunn, thirty years old, sister to the Messrs. Thibault, Chesnut street; she only hears the watch when close to her ears. She has a very delicate constitution. She could not account for her deafness. She had been in the hands of several physicians, without deriving any benefit from their advice. Her treatment lasted about two months, after which she was restored entirely.

**CASE 26.—May, 1831.**

\*Mr. Thomas Roney, forty years old, of Philadelphia; had been deaf for a long time in both his ears, but more so in the right. He consulted my friend Dr. Parrish, who sent him to me. After a rational treatment of a few weeks, Mr. R. improved very much, but I told him, from the nature of his deafness, that it would require several months before he could perceive the whole amount of his improvement, which was much greater than he was now aware of. I found that my opinion on the subject was borne out by the actual fact. He is now entirely well, and has acquired a most astonishing degree of delicacy of hearing.

*Philadelphia, October 16, 1834.*

DEAR SIR,

It is with much pleasure that I congratulate you on your safe return to this city. To your inquiries respecting the state of my health during your absence, I reply, that in general it has been very good, and that my hearing, concerning which I suppose you had particular reference, has been, and still is, excellent. As it was very defective, at the time I had recourse to your skill, it will, doubtless, give you pleasure to be informed, that I think I may say, that I can now hear with more quickness and ease than I could ten or twenty years ago, and that though I did not experience immediate relief from your applications, yet I have no doubt that I am indebted to *you*, under Providence, for the entire restoration of my hearing.

With sincere thanks to you, Sir, for your attention to me while under your care, and hoping that your ability as a physician, and more especially your knowledge of the diseases of the ear, and your skill in removing those diseases may be publicly known,

I remain, Sir,

Your obedient servant,

THOMAS RONEY.

Jos. Togno, M. D.

**CASE 27.—May, 1831.**

Mrs. E. McLeod, 30 years old, of Philadelphia, from exposure she became all at once very hard of hearing, so much so that she began to lose the nicer shades of the human voice and the distinct notes of a pianoforte. She only hears the watch at four inches distance. A treatment of a few days re-established both organs in their pristine state.

**CASE 28.—June, 1831.**

\*The Rev. Mr. Mayer, 45 years old, of Philadelphia, from exposure became very hard of hearing, so much so that he could not distinguish the modulations of his own voice, or know when he spoke sufficiently loud to fill his church; he only heard the watch when very close to his ears. A treatment of a few days has been sufficient to re-establish him again; had he neglected his case, as many very often do, he could not have been cured during a treatment of many months.

**CASE 29.—June, 1831.**

Miss Collins, 21 years old, a seamstress of Philadelphia, of lymphatic temperament; she is subject to catarrhs in her head, which materially augments her deafness. She first perceived a noise in her head four years ago, and from that moment she felt she was hard of hearing in the left ear; the noise has also been perceptible in the right ear for four weeks past, and her deafness has proportionably increased. She remembers that four years ago, at the time she first discovered her infirmity, while in the country, she had the intermittent fever, and used to bathe in a cold spring, to which she attributed the cause of the noise in her head. After a short treatment she has been cured.

**CASE 30.—June, 1831.**

Miss Gaw, seventy-seven years old, of Philadelphia. She first perceived her becoming hard of hearing several years ago. She made use of oils, but experienced little or no benefit arising therefrom. She has a rumbling noise in both ears, and at times it increases. There is a partial ossification of the tympanum; when touched with the probe, it is insensible. There is a great want of sensibility in all the parts of the ear. She only hears the tick of the watch, when close to her right ear, but hears it at four inches with her left. Her health has been generally good. She never has had, previous to this indisposition, any disease in her ears or head, of any consequence. With an appropriate treatment, in the course of a few weeks, she was much improved.

**CASE 31.—June, 1831.**

\*Mrs. Grant, (mother of the Rev. John L. Grant,) seventy years old, nearly totally deaf for more than twelve years, the cause and origin of which could not be traced. After a short treatment, completely restored her to her hearing. This is one of the most astonishing cases treated by me.

*Philadelphia, October 21, 1834.*

MY DEAR SIR,

It is with pleasure I comply with your wishes in communicating the facts relative to my mother's deafness, and the relief afforded by your treatment, while under your care. She had been exceedingly dull of hearing for about twelve years, insomuch that it was really painful to hold a conversation with her; and although she had resorted to various remedies, none seemed to afford her any relief. In the spring of 1831, she was providentially placed under your care, and since that period, her hearing has been perfectly good. Whether her case resembled that

of the majority of persons afflicted with deafness, or whether the means employed in the restoration of her hearing, would alike benefit every applicant, belongs not for me to decide. Of one thing I am certain, she was once very deaf, but now enjoys as good hearing, as though nothing had ever affected the organs of hearing.

Yours, very truly,

JOHN L. GRANT.

Dr. J. TOGNO.

CASE 32.—*July 15, 1831.*

Robert B. Hutchins, 29 years old, a single man. He first perceived his deafness about eight years ago. The right ear is the worst; however, he hears the watch with both ears at the distance of about eight inches; his ears are both inflamed. He is subject to headaches; his eyes are suffused with blood, and there is a determination of blood to his head; he also complains of much noise in it, resembling the beating of the pulse; it, however, is not constant, but increases every time his attention is directed to *listen* to any thing, and especially by night. He observes, that when a boy he had great dread of water and could scarcely be induced to wash his face or wet his head. He was, and yet is, very timid. He habitually and daily indulges in musing and silent meditations; and in this state, to use his own words, he is "*full of fancies if not fanciful.*" With this dread of water, he was, when a boy, plunged in the water by other boys; and thinks the violence of the shock affected his hearing. His head is singularly flattened on the side, but the organs of ideality, according to Gall, are very much developed. A short treatment improved him very much—but Mr. H., before I could perfect his cure, disappeared, and I do not know how his case terminated, but I have reason to believe he is entirely well.

CASE 33.—*July 18, 1831.*

Mrs. Catherine Peterman, fifty-one years old, of Philadelphia, first perceived her hardness of hearing about four years ago. She had taken cold, which was followed by a discharge of matter from her right ear only, which lasted nearly three weeks. She first observed a noise in her right ear; soon after it discharged, and it has lasted ever since. At the time she had the discharge from her ear, she had also a violent earache, which lasted four days, during which time she suffered a great deal. She faintly hears the tick of a watch with her right ear, when in contact, and with her left she hears only a little better.—Greatly improved, after a treatment of a few weeks.

CASE 34.—*July, 1831.*

Miss Cresson was afflicted with deafness about twenty-five years. It was brought on by the scarlet fever, producing at first a discharge in the left ear alone: the other never did. She has been using remedies to cure herself, but could never succeed. During a short treatment, greatly benefited.

CASE 35.—*August 3, 1831.*

L. N. Beauregard, thirteen years old, from New Orleans, of a weakly

and sickly constitution. Ever since his friends can remember, he had a fetid and unpleasant discharge from both his ears, which had rendered him now very hard of hearing, and had prevented his education from being attended to.—He did not hear the watch. He is very stupid; indeed, he has many symptoms of idiotism. He has a difficulty in his speech, caused by his loss of hearing; his mind is not as developed as a child four years old; still his countenance indicates a boy that might be made a clever one by education, had he his hearing. I examined his ears, and found that there was in the right a polypus, which had destroyed, by its constant suppuration, the tympanum, and carried away the malleus, &c. The left ear was nearly in the same state, except that there was no polypus excrescence. In the course of three months, his ears were completely cured, his hearing greatly improved, and could hear the watch at two feet distance. In the course of six months, he heard the watch at the distance of eight or nine feet, the tympanum was partially reproduced by nature, his intelligence has greatly improved from the appropriate education he has been receiving at Mount Airy College; and, on the 26th of May, 1832, he wrote to me the following letter, which shows the superior degree of intelligence he has acquired, and proves how completely he is cured.

*Mount Airy, le 26 Mai, 1832.*

Mon cher Docteur,

J'ai reçu une lettre de papa l'autre jour, dans laquelle il me dit de vous demander si vous avez reçu le mandat de la somme de \$200 qu'il vous a envoyé: car étant, en ville il y a deux semaines, je comptais aller vous voir; mais je n'ai pas eu le temps, et il fallait que je revinsse à mon collège le même jour. Tâchez de me rendre réponse, le plutôt possible, parce que je compte écrire à papa aussitôt que je recevrais votre lettre. Je me porte très bien, et mes oreilles sont en parfaite Santé, Ecrivez-moi de suite;

et suis votre dévoué ami et serviteur,

L. N. BEAUREGARD.

DR. TOGNO.

#### CASE 36.—*July, 1831.*

Elizabeth Tompson, fourteen years old, a brunett, not scrofulous, tolerable good constitution, now enjoys perfect health. When six years old, the parents first perceived the puriform discharge from both her ears at once, and this state continued alternating with moments when the ears would dry up: and, when this was the case, she did not hear so well. However, she only hears the watch when it touches her ears. She is very subject to cold in her head. A short treatment restored her.

#### CASE 37.—*August 17, 1831.*

Mrs. Huntley, thirty-five years old, of Philadelphia, has had a puriform discharge ever since she was a child, which appeared and disappeared at different times, and at last made her deaf of her left ear, so as to faintly hear the watch only when it touched it. The left ear is dry at this time, and there is no discharge. The tympanum of this ear is insensible, even when touched with a probe, and there is also a white calcareous substance within it, which materially helps to increase

her deafness. In the right ear, there is a discharge of matter which conceals the tympanum, and has destroyed its texture.

It must be observed that her sister and niece were both in the same state as herself. After a treatment of a few weeks, she has been cured, and now hears a vast deal better, notwithstanding the immense destruction of the part by the long standing of this discharge. Her left ear, out of which she could not hear at all, has become, after the operation, the best.

#### CASE 38.—*August 18, 1831.*

\*Samuel Hershberger, twenty-three years old, of the Northern Liberties, Philadelphia, a plasterer by trade, being at work in a damp cellar, five weeks ago, while very warm, and tired with working, he set down to rest himself; he soon felt a kind of deadness, heaviness or dulness of sensibility about his ears, which immediately affected his hearing. Three days afterwards, he complained of a constant noise in his head, like the hammering of iron by a blacksmith, which increased to such an extent at night, even to produce a fever: and one night especially could not rest at all, in consequence of the violence of a beating sensation. All he did to relieve this state only augmented his sufferings; his hearing, however, grew worse and worse every day; he could just hear the watch.—A short treatment completely restored him to his former hearing.

#### CASE 39.—*August 27, 1831.*

Mrs. Mary Vanartsdalen, thirty-one years old, first perceived her deafness nine years ago, which resulted from a bad cold in her head. This hardness of hearing came gradually on her; she complains of continual noises in her head, but particularly in her right ear, out of which she is very hard of hearing. She hears the watch with her right ear, at one inch distance, but at two inches with her left. She was salivated three years ago, her gums still soft, and her breath mercurial and foetid.—It is a case of internal catarrh of the ear. After a short treatment, she improved very much in health, and her hearing has improved tenfold, which is very great for her.—The noises in her head being scarcely perceptible except at times, when it is very slight.

#### CASE 40.—1831.

\*Mr. J. F. Watson, twenty-six years old, with an inflammation of the whole ear from exposure, and has an obstruction of the Eustachian tube, which has lasted two years. Mr. W. is a merchant;—two years ago, while on a visit to Philadelphia, he first perceived his deafness in the left ear, which however had been increasing gradually. Within nine months, the right ear also had become hard of hearing, while Mr. W. was in South America. While in Chili, he crossed and recrossed the Andes, and soon after felt this hardness of hearing in his right ear. He had scrofulous tumours in his neck, to the drying of which he ascribes the deafness in his left ear.—He hears in it the watch only when in close contact with the ear, and then faintly; in the right ear, he hears the watch at two inches tolerably well; he can hear high shrill voices best: but he remarked that “the low, soft undulations of the human voice, which constitute its charm, are entirely lost

to me." A glass of wine, or a segar, produces a dulness of hearing quite intolerable, accompanied with a fulness in the ears, which oppresses him. The treatment of one month cured him completely.

**CASE 41.—October 4, 1831.**

Miss E. Houck, twenty-five years old, of Philadelphia.—She ascribes her deafness to a cold produced by sitting in the draft of a window. She is deafener when she has a cold in her head, and moreover the noise which she experiences in her right ear, is greater than before or after a cold. She leads a sedentary life.—Her health generally good; her right ear first became deaf three years ago, and six months since her left ear also became deaf, in consequence of a cold, and she is now very deaf. She only hears the watch with her left ear, at the distance of an inch from it: but with the right, only when closely applied to the ear. The treatment adopted in her case, has been signally successful. She now hears the watch at the distance of three feet with her left ear, and with her right at even a longer distance; the noise is entirely gone.—Improved beyond expectation.

**CASE 42.—October 19, 1831.**

Miss Rebecca Davidson, twenty-three years old, a seamstress, first perceived her deafness thirteen years ago. She is of a lymphatic temperament, and fair complexion. She has had a discharge of scutid matter for fourteen years from her left ear, which has destroyed the tympanum.—She hears the watch with this ear only when in close contact with it. She hears the watch at three inches distance with the right ear; she nevertheless says that this ear is the worst to hear the human voice.—Completely cured.

**CASE 43.—October 27, 1831.**

\*In the year 1826, and I think about the month of August, I received my deafness when bathing in Scotland. The waters (salt) was very muddy, having a soft clay bottom, and in diving I staid too long below the water. That day, or the day after, I experienced a severe pain in the inside of my left ear, as if it were near the palate, the pain was so great that I had some difficulty in moving my jaws to eat. I foolishly concealed the real cause of my deafness from my relations at the time, and ascribed it to a bad cold, thereby losing the benefit I might have received from timely measures. Soon after this (say three weeks or a month) I had a bilious attack, and I quite well remember, I was worse during the sickness than either before or after; the doctor was obliged to speak very loud for me to understand his questions.

In two weeks, or so, after, I got better. I left England for Charleston, still neglecting to take a surgeon's advice. In the winter of 1826, 1827, I applied to Dr. B. Simons, of Charleston, who caused my ears to be syringed with lukewarm water, and afterwards a drop of goose oil, I think, with some cotton, was put in, and this was renewed every day for about two or three weeks; he finally put a blister behind my left ear, but no good resulted. About this time I also tried the steam vapour bath *once* with the same success. In the spring and summer of 1827, I was put under the care of Dr. Wagner, of Charleston, who was of opinion that the deafness was altogether, or partly, owing to a diseased

state of the *liver*, accordingly, I was put under a course of medicine for at least two months. I found no benefit to my ears from this, although I felt vastly better in health. Nothing further was done till the summer of 1828, when I went to New York and applied to Dr. Mott, who examined my ear, but he said it was so full of hair he could not satisfy himself. He then put a wire up my nose and found out there was no obstruction in the internal orifice of the ear. He advised me to try electricity, and accordingly, I went to a man who kept a machine, and who was recommended by Dr. Mott, for his mode of performing. I was electrified inside of the ear. I continued this about two weeks every morning. Dr. Mott gave at the same time a prescription for oil, to be used with wool, but no good was done. In 1830, I again applied to Dr. Wagner, in consequence of having discovered a considerable quantity of soft wax, which had run out of my left ear on my pillow, and which I thought a favourable sign; he thought so too, and immediately syringed the ear and thoroughly cleansed it. He then put in, with a syringe, some mixture (the name I forget) which was intended to take off the cuticle of the ear; the liquid made the skin black, and in a day or two very fine particles of skin, like the wings of insects, came out. Dr. Wagner ascertained the drums of the ear to be unbroken, and dismissed me without doing any perceptible good. You will perceive that to this time every operation was confined to the *left* ear, which I had always considered to be the deaf one. I began to be puzzled which ear to call the deaf one, and never precisely ascertained that fact till very lately. Last spring, Dr. Leseigneur, of Charleston, volunteered to try me, and I was put under his care. I had been taking his medicine for about a month before for another complaint, but whether it had any reference to the deafness or not, I cannot say. He commenced by applying two strong blisters, one behind each ear, which drew a great deal of matter, and he was only waiting till they would close, and more favourable weather, to apply two more, when urgent circumstances obliged me to leave Charleston. I felt *slightly* better after this and the doctor was very sanguine of performing a cure; as well as I remember, he intended to have put my head in a vapour bath, and to put an *issue* (I think they call it) in my neck. He would not permit me to go out in the night air. The benefit I received did not last long. I am confident I am worse now than I was five years ago. At this moment I am certain the right ear is worse than the left. I can hear the ticking of my watch plainly with the latter, but hardly at all with the former. When I press my jaws strongly together, I feel a slight pain inside of my right ear. I have experienced very little or no pain in my ears since 1826. I sometimes, but seldom, fancy I hear the ringing of bells, or sounds of that description. The changes of weather seem to make no difference, but when I have a cold I am much worse. I have gradually been growing stouter for the last six years, and am at this time much fatter than in 1826. I will be twenty-one years of age in January, 1832. It may be worth while to say that some of my school-fellows, who got deaf about the same time, and in the same way, recovered soon after—one of them by putting in oil, keeping his head tied up in flannel, and staying in the house. I have not accustomed myself to sleep with a night-cap.

W. G. BROADFOOT.

Philadelphia, October 26, 1831.

Mr. Broadfoot, a native of South Carolina, has been deaf for six years; he has undergone a great many treatments, as we see by his own account, but without the least improvement. He hears the watch with the left ear at one inch distance, but with the right only when it is in close contact with it. Treated him only a few weeks, but still there was a great improvement, that gave some comfort to converse with him, while before I was obliged to speak very loud. His case was not however completely terminated, because he was obliged to go home.

#### CASE 44.—*September 4, 1831.*

Mr. Williamson, eighteen years old, from Wilmington. He first perceived his deafness eighteen months ago. He cannot give any account of the cause of his deafness; but he thinks that it is owing to his going to bathe in the river while yet warm. This exposure has produced a catarrh of the ear and Eustachian tube. He hears the watch at the distance of eight inches with both ears. After a treatment of a month he has been entirely restored.

#### CASE 45.—*September 12, 1831.*

\*Miss Mary Kirk, thirty-three years old, a seamstress, lives at Willow-Grove. She first perceived her hardness of hearing about two years ago. She hears the watch only when in close contact with the right ear, but with the left she hears it at four inches distance. After a treatment of three months restored to her hearing.

#### CASE 46.—*September 13, 1831.*

Miss Teisseire, fifteen years old.—She has had a discharge ever since she was four years old, and it has continued ever since, sometimes more, at others less. The tympanum of both ears destroyed, and the small bones carried away by it. She suffered very much from her ears; she does not at present. After a treatment of several months, cured.

#### CASE 47.—*September, 1831.*

\*Mr. James Taylor, sixty-four years old, Walnut street.—He first perceived his deafness a few days previous to coming to me, when being exposed to a current of air while in the cellar of the Unitarian church, when yet damp, and on a damp day. In this place he took a catarrh in both ears; he never was so afflicted before. He hears the tick of his own watch with his right ear when close in contact with it, but with the left, very little, even when close in contact with the ear. He could not hear the preacher, Mr. Furness, whose voice is very distinct, although he was only a few feet distant from him. After a treatment of a few days, he was completely cured, and his hearing as good as ever it was. Before being cured, could not hear to converse—which astonished a friend of his; but after the treatment he had again some business with him, and the friend, as soon as he saw Mr. T., began to halloo as loud as he could, to make him hear, but, to his great surprise, he was told by Mr. T. to speak in his ordinary tone of voice, for, said he, I can now hear as well as ever. This gentleman was Nicholas Biddle, Esq.

Early in September, 1831, I became so deaf as not to be able to hear a person speak, unless he was very near to me. In this situation I applied to Dr. Togno, and after a few visits to him, he succeeded in dislodging from my left ear a substance that resembled cloth, when my hearing was restored. I have frequently mentioned this fact, being desirous that persons whose hearing is defective may profit by my experience.

To DR. TOGNO.  
October 31, 1834.

JAMES TAYLOR,  
246 Walnut street.

#### CASE 48.—*September 14, 1831.*

Miss Robertson, twenty-five years old, from Wilmington.—She first perceived her hardness of hearing after having taken a bad cold from a great exposure. She has a noise in both ears—rather more in her left. She hears worse with her right ear. She has been blistered, and has been using many remedies, without the least advantage. After the treatment of two weeks, entirely restored to her hearing.

#### CASE 49.—*March, 1832.*

\*Peter Stewart, 50 years old, a coloured man. He is Mr. Thomas Rockhill's waiter. He became deaf gradually, in consequence of a severe cold in the head from exposure. He has been deaf in the left ear for these six weeks so as not to hear at all out of it. On examination found that the whole internal ear was inflamed and red, like a piece of scarlet cloth, and the Eustachian tube closed up so as not to admit any air. A treatment of three or four weeks entirely restored him; and now, October, 1834, he has his hearing as perfect as ever.

#### CASE 50.—*May 16, 1832.*

Thomas Henry, a cabinet maker, 18 years old. He has had a discharge from his ears ever since he was four years old, particularly from the right ear, the left being now nearly dry, with some black cerumen in the meat. ext. He complains of great earache in the right ear, with roaring noise; he has not been able to sleep for a week from the earache; the right ear, just before it is going to discharge, beat like a pulse; and when the discharge occurs it ceases. The meat. ext. of the right ear contains some fetid matter; he hears the watch with the right ear at two inches distance, and with the left at a foot. The treatment has been long and tedious, in consequence of his being an apprentice, and not able to attend to it regularly; but, at last, he was completely cured.

#### CASE 51.

\*About the 1st of April last, I took a severe cold, the cause of which, I presume was, being in the cellar of my store, selling goods for some two hours, where it was very damp, without a hat. Immediately thereafter my hair nearly all came out, and I was very deaf in the left ear, and had a loud buzzing noise in it also, and partially deaf in the right ear, but no buzzing noise.

I did not apply for medical aid until about the 1st of May. I had at first twentyfive leeches applied behind the left ear—after

wards had blisters behind each ear, which run for several days, and then had a hot substance (I dont know what it was) put into the left ear, which caused it to blister the ear inside, which also run for several days—all of which had no effect. I then for three weeks remained without doing any thing for it, and then called on my physician again, who advised me to drop five drops of French brandy in the left ear at bed time, which I did for several nights, but it had no effect. The doctor then ordered me to be bled a pint, and dieted strictly for a week. I did so without effect, and then called again on the doctor, and informed him of the unsuccessful treatment. He told me he did not think of any thing more worth trying, unless I would have the left side of my head shaved and blistered. In answer to which I informed him, that inasmuch as this was but an experiment I could not yield to it. The preceding accounts, as near as I can recollect, are in accordance with the advice and prescriptions of Dr. John Wilson Moore, all of which has not had any effect, and the buzzing noise and deafness has reached both ears.

JOHN W. HALL,  
203 Market street.

Philadelphia, July 19, 1832.

Mr. Hall further remarks, that at the time he was first taken deaf he had several lymphatic glands of his neck swelled.

The present state of his ears.—The right ear, the meatus is very narrow, the tympanum is very opaque and small; there is also some cerumen. He hears my watch when touching the auricle.

The left ear, the meatus is also narrow, the tympanum also small and rather less opaque, some cerumen in the meatus ext. He hears my watch when touching the auricle.

The Eustachian tubes of both ears are partially impervious; the predominance of his lymphatic temperament is very evident by his delicate frame, clear complexion, &c. Treated most successfully and completely cured.

#### CASE 52.—*August 25, 1832.*

Mr. T. F. Browning, twenty-seven years old, No. 127 Chesnut street, of a spare, fair complexion.—Was first taken deaf six weeks ago, when he was struck with the hand on the left ear, which produced a noise in his ear that renders him hard of hearing. The right is somewhat affected by it.

Examined his left ear. It is not inflamed, nor is there any thing indicating any inflammation in any part of it. He can hear the tick of my watch at the distance of two feet. He says that the noise increases after dinner, or after drinking a glass of wine. Treated and cured in a short time.

#### CASE 53.—*September 3, 1830.*

Rebecca Edwards, when four years old, had a very severe attack of the scarlet fever, and after her recovery from that, a very bad gathering in her head; both her ears discharged very much. I have used a great many different applications, but all proved of no effect until I was recommended to Doctor Togno, and I hope he will prove successful in curing her, as I think she is already better from his treatment.

SARAH EDWARDS.

*August 2, 1832.*

This case presents an extremely fetid discharge, at this time, from the left ear.—Her hearing is very much impaired.—She only hears the watch when it touches the ear.—Both the auricles and internal part of the ears were very much inflamed. After a short treatment, cured.

**\*CASE 54.—September 20, 1832.**

DEAR SIR,

Permit me to recommend Mrs. Hunt, one of my best friends, to the best exertions of your skill as an aurist. I shall greatly rejoice if you can succeed in even improving her hearing.

Your Friend, CH. D. MEIGS.

DR. TOGNO.

*Philadelphia, September 20, 1832.*

SIR,

About seventeen years ago I perceived that my hearing was affected. At the time I took but little notice of it, conceiving it to be the effect of a cold I had taken, in consequence of exposure. At this time my right ear only was affected. I could perceive, for four or five years, my deafness seemed to increase whenever I had taken a cold. At the expiration of that time my other ear began to be affected, and at the same time I was affected with dizziness in my head, at times. After this I could perceive, more particularly at nights, on retiring to rest, a sensation in my head like a noise, attended very frequently with itching of the ears, more particularly in the right one. My deafness continued to increase, from time to time, until within the last six months since which it appears to be about stationary. At this time the sense of hearing is so much affected, that it is with difficulty I can get along with my ordinary business—several members of my family having to speak so loud that it renders my situation and theirs very unpleasant.

I have concluded to put myself under your care, in hopes you may be able to do something to relieve me.

Yours, very respectfully,

ANNE G. HUNT.

DR. TOGNO.

Mrs. Hunt is thirty-eight years old. Her ears have been inspected by me and I found the external meatus clear, except a little cerumen in it. The tympanum is tolerably healthy and sound. Her Eustachian tube of the left ear is partially pervious, but the one of the right is entirely impervious—and this ear is the one in which she hears the least. She only hears my watch when it touches the auricle. Her speech is somewhat imperfect from her hardness of hearing, and very often she speaks so low, that it is impossible to hear what she says. She is of a nervous, sanguine temperament. She never did any thing for her hearing. She complains of a constant singing noise in her left ear only, and particularly when she has her mind engaged in some business. She is rather a delicate woman, and has complained of a pain in her chest for a year back, which is now fixed in her left side. She is the mother of six children. She is very much troubled with cold feet.

The treatment has not lasted as long as it was necessary to complete the cure; however, her hearing has been so far improved as to make

her and her friends comfortable when conversing. During one of the many injections which were performed to open her Eustachian tubes, she at last, on the opening of the one on the right side, all at once, heard so very plainly that she begged me and her children not to speak so loud, although we were only speaking in our common tone of voice, and when I happened at that moment to blow my nose, she told me that the noise I made was so great that she could only compare it to a noise proceeding from a nose, the nostrils of which were as big as a hogshead.

**CASE 55.—November 9, 1832.**

\*Elizabeth Bunting, fifteen years old.—She has had a discharge from both her ears ever since she can remember. She is of a lymphatic temperament and delicate constitution. She can hear the watch at the distance of one inch with the right ear, and only when it touches the ear with the left. There is in the left ear, at this time, an abscess, and the external meatus is very much swollen. The tympanum of the right has an ulcer on its centre, but the meatus is not otherwise affected. She has a constant beating in her left ear especially, which has the rythm of the pulse, and is no doubt produced by the circulation. She lives in the neighbourhood of Philadelphia, and therefore saw her only once or twice a-week during the treatment, at the end of which has been completely restored, and is very much improved in her general health and intelligence—for, when she first came to me, like in many similar cases, she appeared rather dull and stupid.

**CASE 56.**

*November 28th, 1832.*

\*After a severe illness, during the summer of 1830, I discovered that my hearing was much affected. I was advised by Dr. Condie to apply a few drops of sweet oil to the ears, three or four times each week; after finding this course to be abortive, I made application to Dr. Horner about the 1st of May, 1831, who carefully examined the ears, syringed them with warm water, ordered leeching frequently, during the three following months; he then directed an equal quantity of sweet oil and laudanum to be applied daily; he also ordered bleeding in the arms, once in two weeks, while taking some purgative pills.

Finding this course to be productive of no benefit, he ordered fine table salt to be applied to the head at night, and bathing of the same on the following morning with Bay rum; I implicitly obeyed his directions until June, 1832. I then became alarmed in consequence of the disease growing worse: I could no longer distinguish between chords and discords, was much distressed with headache and vertigo, and heard a continual roaring in the left ear similar to distant thunder; I grew absent, and was tormented with frightful dreams, with their concomitant effects. I consulted Dr. Physick, who examined the ears in the sunshine, and remarked that “there was no malformation or anything of the kind;” he ordered the same treatment of Dr. H., except three grains of calomel, twice a week, instead of the pills.—I have pursued this course until the present.

S. ADAMS,  
No. 62 South Fourth street.

Mr. A. is a cabinet maker, and a temperate man; he is not subject to catarrhs; he hears the watch with the right ear, at the distance of four inches, but only when it touches the left auricle.

The meatus of both ears is in a good state as well as the tympanum; there is no cerumen in the meatus.—The left Eustachian tube is impervious, but the right is less so.—The noise of which he complains, is entirely or nearly so, in the left ear or side of his head, which is very great. After a treatment of several weeks, Mr. A.'s hearing greatly improved: and his left ear, which was his worst, is now his best ear, and he hears the watch at the distance of three feet.

#### CASE 57.—*June 30, 1831.*

Mrs. Rebecca Hood, aged forty-five years, of Philadelphia, first perceived her hardness of hearing ten years ago. She ascribes it to her having the toothache very often, and to the remedies used to relieve it; she complains of a beating in the right ear, precisely like the pulse: obstruction of the Eustachian tube; she does not hear the watch with the right, but with the left hears it at the distance of one inch. After a treatment of several months cured, so as to be enabled to carry on a conversation across the room. This is a very successful case.

#### CASE 58.—*November 6, 1831.*

Mrs. Murheid, an old lady, from Trenton, first perceived her deafness three years ago. She has used, but in vain, many vegetable oils recommended by her friends and by physicians. Of late, her hearing has become worse, owing to an obstruction of the passages. She does not hear the watch with her right ear, and she only hears it with her left when closely applied to the ear. After a treatment of a few weeks, entirely cured.

#### CASE 59.—*January 18, 1833.*

As well as I can recollect, I have always been subject to the ear-ache at times. When about seven years of age I was taken with a violent pain in my left ear, which gathered and broke, and has continued to discharge more or less ever since, and, at times, would pain me, though not very severely, but would feel very sore around the outside of my ear. I frequently applied warm poultices and hot herbs to the ear, and would drop in the oil of almonds; then syringe it with warm milk and water, which would frequently relieve me; but for some time back it has not discharged so freely as it used to, still my hearing continues very bad. My right ear has never gathered until last Spring, but, on the contrary, always appeared as if there was a hard crust upon the drum of the ear, which I used to think caused the deafness; but I never felt any pain. I would then drop in the oil of almonds and syringe the ear with warm milk and water, repeating this for two or three days, which used to restore me to my hearing for awhile, but since it has gathered I have frequently felt the soreness around the outside of the ear. I have applied both mustard and fly blisters, warm poultices and herbs which would sometimes relieve me, and my hearing in that ear for awhile would be very good.

Miss Elizabeth Cresson, No. 138 North Eighth street, aged 19.

About seven years ago, the affection of the ear, above described, appeared; now, (Jan. 18, 1833,) her ears are both with sores over the tympanum, and there is a discharge of matter, with some mucous. She hears my watch at the distance of two inches; she has a difficulty in her speech; she is subject to sore throat and enlargement of the tonsils, and whenever she has a cold she is worse. She is of a lymphatic temperament. After a short treatment greatly improved.

#### CASE 60.—*February 1, 1833.*

**Mrs. Guier**, 43 years old. About nine years ago she was at the Seashore, where, going into the water, she was exposed to a violent surge, which brought on this deafness soon after returning home. She had also a cold soon after she had been in the water, and when she went in she was very warm, which produced it. She had no sickness since this exposure to which this can be ascribed; she is now in good health, with a tendency to obesity. When she first had this attack she had a great noise in her head, but more on the right side than on the left. She has, however, very little now.

The right ear—she does not hear the tick of my watch when it touches the auricle of this ear; the Eustachian tube impervious.

The left ear—The tympanum very clear and pearly; the Eustachian tubes are partially impervious in both ears. She hears the watch only when it touches the auricle.

After a short treatment greatly improved.

#### CASE 61.

**Miss Longacre**, daughter of Mr. Longacre, Engraver, four years old; in a short time entirely cured of a catarrh in one ear, and of an abscess in the other which rendered her very uncomfortable.

#### CASE 62.

\***Mrs. West**, niece of Mr. Longacre, Engraver, 20 years old, of a fair and decidedly lymphatic temperament; very hard of hearing accompanied with headaches and violent earaches. After a short treatment restored her entirely.

#### CASE 63.

\***Mr. H. Buzby**, 40 years old; hard of hearing for many years; but he neglected it, not knowing that he could receive any relief, having already tried, without any benefit, many remedies that were recommended to him by various physicians. Cured entirely.

#### CASE 64.

\***Mr. Simmons**, Lumber Merchant, 30 years old; has been very hard of hearing for many years; could not hear the tick of my watch unless close to the ear; both the Eustachian tubes partially impervious. After a treatment of two months entirely cured.

## CASE 65.

Mrs. R. M. Pennock, of Chester County, in consequence of a sedentary life had a continual rush of blood to her head, with enlargement of the arteries about and close to the organ of hearing, which produced a constant beating in her head, and she was so deaf as scarcely to be able to hear the watch. After a tedious treatment so much improved as to make her and her friends very comfortable. She can carry on a conversation now across the room.

## CASE 66.

Miss Frances Fisher, aged 22, a seamstress, and leads a very sedentary life. It is already three years since she was first attacked with hardness of hearing which was brought on by a very bad cold in her head. She called on Dr. Wood, who recommended a blister behind the right ear, which is now the best ear for hearing. Some other things were done to the meatus ext. in order to produce cerumen, but none was produced, on the contrary, the meatus became hard and rough. Ever since she has been putting in some almond oil or sweet oil, which she thinks did her good,

Right ear—Meatus ext. no cerumen, and tympanum clear, very little mucus within it, the Eustachian tube is less impervious than the left; there is a crackling when the air is forced into the cavity of the tympanum—not so in the left ear. She hears the watch only when it touches either auricles; but better with the right than the left ear,

Left ear—Meatus ext. the same; tympanum opaque and whitish, mucus within; Eustachian tube and cavity of the tympanum partially full of mucus.

She has had from the first, and there still continues, a variety of noises in her ears, such as ringing of bells, rush of wind, &c. She is very subject to having colds in her head, which affects her hearing. In a short time greatly improved; and we suppose by this time entirely cured, for she never came to see us again, or to pay her bill.

CASE 67.—*November 12, 1832.*

Mrs. Risdon, thirty years old, residing at No. 353 North Sixth street, has had seven children,—and always enjoyed excellent health. She first perceived her hardness of hearing about three years ago; when she had a cold, it became more perceptible; but within a year she has become worse, and the noise which was at first a mere buzzing sound is annoying to her now. She has used sweet oil, but it did not agree with her ears, and she thought that animal oil did better. She secretes very hard cerumen: and when it accumulates, the noise increases in her ears; the meatus externus of both ears looks very well: there is cerumen in it; the tympanum depressed and muddy; she hears the watch at the distance of two inches; when she has a cold in her head, and she blows her nose, the air passes into the cavity of the tympanum with difficulty, and in its passage produces considerable pain, being a chronic inflammation of the Eustachian tube, extending into the cavity of the tympanum.—Entirely cured.

CASE 68.—*July 29, 1831.*

Miss Rachel Saulnier, No 438 Race street, twenty-four years old,

has had a discharge from her right ear ever since she was four years old; it discharges from time to time,—and before it discharges, there exists a considerable noise and hardness of hearing: but after discharging, they cease. There is now a mucous puriform discharge, and at times it is, she says, very foetid.—The meatus ext. is very small. She sometimes hears very well, and at other times she is very hard of hearing, and has considerable pain in her ear. After a long and tedious treatment, cured.

#### CASE 69.—*June 30, 1831.*

Mrs. Anne Brown, fifty-seven years old, residing at No. 250 North Second street, has been hard of hearing for four or five years. She perceived her left ear to be worse than the right from the beginning. She is of chlorotic taint.—When she stands, she hears a noise in both ears at times, but particularly in the left ear, which is the worst. When she lies down, she does not hear the noise of thunder, but hears it very distinctly when sitting up. When she has no noise in her head, the thunder does not appear to her louder than the noise she has in her head. Her tympanum is depressed, and very sensitive; the Eustachian tube is tolerably pervious. She hears my watch at the distance of two inches with the left ear, and at the distance of three inches with her right ear. Treated her only a short time, whereby she was greatly improved: but, like many other patients, as soon as they get well, never call to see the doctor, even to let him have the gratification of perceiving that they are entirely well,—we have reason to believe her perfectly cured.

#### CASE 70.

Mrs. Margaret C. Breautigam, aged thirty-seven years, first perceived the deafness of her left ear three years ago, and it has grown worse. She only hears the tick of the watch when very close to the ear. In a very short time she was perfectly restored to her hearing.

#### CASE 71.

Mr. Cunningham Brown, aged twenty-seven years, first perceived his deafness seven months ago.—He is subject to cold in the head, and this came on him after a bad one; the first symptom was a beating noise, which still continues. The right ear, although inflamed, did not discharge—but the left did, and has continued ever since at times; his hearing has varied in the left ear with the discharge; the right is now well; the left, however, contains a quantity of matter. When he walks fast, or goes up stairs, the beating noise increases considerably; blisters were applied behind the left ear, and even in the meatus ext., without any advantage; he hears the tick of the watch only when it touches the left auricle. After a short treatment, greatly improved.

#### CASE 72.

\*Samuel Horner, nineteen years old.—I first discovered a sort of ticking in the ear, when I was fifteen years old, something similar to that of a watch. About two weeks after, a sort of ringing came on, and then I found my hearing was deficient; there appeared to be a great

confusion of noise, and a sudden change of it; I cannot describe it exactly; it was not confined to the continual noise, sudden fright or great anxiety, or anything of that kind: or, when I am spoken to, and do not understand, it causes great noise and confusion, especially in company; in the evening, it appears to be worse. My mother's deafness came on about the age of twenty-five or thirty.—She is of a nervous disposition. I have a brother who was taken deaf about the same age as my mother: but he had had a bad spell of sickness just before. I applied to Dr. George M'Clellan, who ordered cupping and purging, and a strict diet. I went on in that way about two months or ten weeks, and found no relief, any more than when I was in a weak state, the noise was not so great; then I did nothing till last January, when I applied to Dr. Gibson, who told me to ascertain whether it was hard wax, by syringing them out with milk and water every day, for a week, which had no effect. Then he ordered a blister behind each ear, to be kept open continually; I have had them on three months, and found no relief, any more than the noise had ceased somewhat, but not altogether.—My head used to be giddy at times: but the application of the blisters helped it. There was an itching in the ear, but no aching—never had much of the headache, but my eyes ached occasionally. I think it proceeded from a cold, which I had caught by getting up out of bed half-dressed, and wading into a pond of water in cold weather.

The treatment of this case was long and tedious: but at last succeeded in curing Mr. Horner, not only of his deafness, but of another infirmity that afflicted him, which was very intimately connected with his deafness.

#### CASE 73.

Miss Neagle, four years old, daughter of John Neagle, Esq. painter. She has a lymphatic temperament, has had a puriform discharge from her ear, which rendered her hard of hearing; and had it been neglected, would have terminated in the destruction of the membrane of the tympanum.—Entirely cured: and now, November, 1834, still entirely well.

#### CASE 74.

Miss E. Ogden, mantua-maker, 20 years old, has been long complaining with a discharge and with hardness of hearing for many years. A short treatment entirely restored her to hearing.

#### CASE 75.

Mrs. Stevenson, 50 years old, very hard of hearing. She is very corpulent; her Eustachian tubes partially impervious. Treated and greatly relieved.

#### CASE 76.

John Stall, a butcher, 20 years old; from exposure both ears very much inflamed; great noise in his head; the membrane of the tympanum very red and full of blood; he could not hear the watch. In a few weeks' treatment cured completely.

## CASE 77.

Mr. Burn, confectioner, North Third street, 35 years old, has been deaf for many years, and hears the watch only at one inch distance. A short treatment improved him so as to hear the watch at two feet distance.

CASE 78.—*November 3, 1832.*

Mrs. A. M. Campbell, 32 years old; married 12 years ago; she had two children, she had her last child three years ago. She had her first eleven years ago, and had puerperal fever in consequence of it, and then she perceived she was deaf of the right ear; so much so, that when she laid on the left side in bed she could not hear. This difficulty of hearing was neglected, thinking it would again be restored as her strength would return. After this complaint she remained dyspeptic and nervous until she had her second child, when her health improved, but her hearing became still worse. Six years ago, she had a bad cold in her head, in consequence of her sitting near a window in the draft, on a very damp day. For this cold she was for six or ten weeks, bled, cupped, purged and blistered every third or fourth day; when at last she was very weak, she was only bled, leeched or cupped only once a week. She derived no benefit whatever from this debilitating plan of treatment. She hears worse when exposed to a damp, cold atmosphere; however, this does not make a very great difference, but whenever she gets a cold in her head she hears worse. If she sits in a room with the windows open she cannot hear, in consequence of the draft. When she is in a carriage she hears better than any one in it. During this last month she has syringed her ears with very warm milk, and believes that her hearing is, if any thing, worse; (all seem to prove that her tympanum is relaxed and her Eustachian tube partially impervious); her nose is very dry, and there is no secretion; her right Eustachian tube is more impervious than the left; formerly her ears were dry, and they ached a great deal; she can hear my watch at one inch distance from the auricle. Four years previous to her having the puerperal fever, after dancing at a ball and being very warm, she held the right side of her head in the rain to cool it; but a month after she had violent toothache and earache, with gum bile; indeed, the whole side of her face was very painful. She then had the right side of her face steamed with herbs, and she got well of it, but she remained a little dull of hearing, on that side especially, when she had a bad cold. She complains of her tears falling on her face in consequence of the tube being impervious from the want of secretion in the mucous membrane generally of the nose, sinuses, &c. At first she heard a very great noise in her ears, so great that she was perfectly distracted, and was relieved by bleeding, &c.; but her hearing became worse. She thinks her hearing has improved more since she has had her last child than from any thing the doctors have done for her. She cannot hear whenever she masticates in consequence of the noise produced by the mouth and teeth. The treatment lasted a month, after which she wished to return home (to Baltimore); she was benefited by it, but the treatment was not sufficiently persevered in. She must be, however, much improved, for we have received a letter, in October, 1834, from Mr. Campbell, and he no longer complains of Mrs. C.'s deafness.

## CASE 79.

\*In the fall of 1822, when I was only ten years old, my mother perceived that I was hard of hearing in my right ear, and she had Dr. Shaw to attend me. He ordered to syringe my ear with warm soap and milk, and to apply a blister behind the same ear. This was done till 1825, which produced no benefit to my hearing. Soon after the left ear began to trouble me, by singing noises, which also increased the difficulty of my hearing. Dr. W. P. C. Barton advised me to drop some sweet oil in the left ear, which I did for several weeks, having at the same time dismissed every other application; but from this, as from the preceding remedies, found no benefit for my hearing, or relief from the noise. In the Spring of 1826, I was advised by Dr. Physick to rub my head with fine salt, which advice was strictly complied with, during two months, and then discontinued, being persuaded that it was in vain I tried it. Finding all the preceding applications unavailing, I then resorted, for a short time, to the dropping a few drops of Holland gin in my left ear only. I directed all my attention to improving the left ear, for it was the one from which I derived any advantage in hearing conversation, having pretty much lost all hope for the right ear since I could not hear even a very loud noise when the other was stopped up. In this state I called on Dr. Togno, in the Summer of 1831, and being very timid and fearful of any operation which might be advised by the doctor, I did not return to see him. From that period till 1834, my deafness gradually increased, so as to become very difficult for me to hear even a loud conversation, when I asked the advice of our family physician, Dr. Meigs, who recommended a seton placed on the back of the neck, which was endured for three months, from which no benefit was received, but only added to my distress. On the 21st of October, 1834, I again called for the advice of Dr. Togno, with the firm resolution to abide by his opinion with respect to my deafness, which now had become intolerable, both as to the noise and difficulty of hearing. In cool weather, when I rise in the morning, I am unable to hear until I have taken exercise; then something appears to move gradually in my head; at eleven o'clock the troublesome and unpleasant sounds then begin in my head, and so my deafness increases until dinner, when I am better able to hear any one speak. My deafness is also augmented by exercise, by being agitated, or by any moral affection that excites my nervous system, which is very easily excited. This is the history of every day of my life, for many years past; but since I have been under the treatment of Dr. Togno, my left ear is already entirely well, and with the right I now hear the tick of the watch, which I could not for twelve years, and the troublesome noise in my head is now entirely subsided.

ADELAIDE GILBERT.

Philadelphia, Nov. 6, 1834.

November 10, 1834.—Mrs. Gilbert went yesterday, (Sunday) to the Academy, in North Fourth street, and was placed in a seat at the extremity opposite the preacher; the distance must be *sixty* feet. She heard the whole sermon distinctly, while before she could not hear it when she sat near the pulpit. The noises with which she used to be tormented have entirely subsided, and her head is now entirely clear.

Nov. 12.—Notwithstanding all the changes which have occurred in the weather, during these few days past, Mrs. G.'s hearing keeps good, while before it used to vary very much with the weather.

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